ANNUAL REPORT

OF THE

COCOA RESEARCH INSTITUTE OF NIGERIA, IBADAN

2004

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COCOA RESEARCH INSTITUTE OF NIGERIA
P.M.B. 5244, IBADAN

PRINCIPAL ADMINISTRATION AND RESEARCH STAFF LIST
AS AT 31 DECEMBER, 2005

IMC MEMBERS

S/NO	DESIGNATION	NAME	QUALIFICATION(S)
1	Executive Director	Prof. G.O. Iremiren	B.Sc., M.Sc., Ph.D
2	Assistant Director (R)	Dr. (Mrs) F.A. Okelana	B.Sc., M.Phil & Ph.D
3	Assistant Director (EUR)	Dr. O. Olubamiwa	B.Sc., M.Sc., Ph.D
4	Assistant Director (EAE)	Dr. E.O. Aigbekaen	B.Sc., M.Sc., Ph.D
5	Assistant Director (PBM&T)	Dr. O.A. Fademi	B.Sc., M.Sc., Ph.D
6	Administrative Secretary	Mr. J.O. Babafemi	B.Sc., MPA, MNIM

7	Chief Accountant	Mr. O.S. Adefaka	B.Sc., MBA
8	Internal Audit/Asst. Chief Accountant	Mr. A.S.B. Akanni Mr. O.O. Fagbami	OND, HND, MBA, ANAN, AMNM
9	Chief Librarian	Mr. G.E. Ubani	B.Sc., MLS
10	Maintenance Engineer		B.Eng., PGDIP (Metallurgy) PGDIP (Bus. Ind. P/Mgt.)

RESEARCH

S/NO	NAME	QUALIFICATION(S)
	PLANT PATHOLOGY	
1	Dr. (Mrs.) L.N. Dongo	B.Sc., M.Sc., & Ph.D
2	Dr. S.O. Agbeniyi	B.Sc., M.Sc., M.Phil, Ph.D
3	A.R. Adedeji	B.Sc., M.Sc.
4	A.H. Otuonye	B.Sc.
5	M.O. Okeniyi	B.Agric.
6	S. Orisajo	B.Sc., M.Sc.

S/NO	NAME	QUALIFICATION(S)
	PLANT BREEDING	
1	Dr. O.A. Fademi	B.Sc., M.Sc., & Ph.D
2	Dr. S.S. Omolaja	B.Sc., M.Sc., M.Phil, Ph.D
3	Dr. O.M. Aliyu	B.Sc., M.Sc., Ph.D
4	P.O. Aikpokpodion	B.Sc., M.Sc.
5	Mrs. A.A. Muyiwa	B.Sc.
6	K.E. Dada	B.Sc.
	AGRONOMISTS	
1	Dr. A.O. Famaye	B.Sc., M.Sc., & Ph.D
2	Mrs. E.A. Adeyemi	B.Sc., M.Sc.
3	A.O. Olaiya	B.Sc., M.Sc.
4	L.A. Hammed	B.Sc., M.Sc.
5	A. Oloyede	B.Sc., M.Sc.
6	K.O. Ayegboyin	B.Sc., M.Sc.
	ENTOMOLOGISTS	
1	Dr. (Mrs.) F.A. Okelana	B.Sc., M.Phil., & Ph.D
2	T.C.N. Ndubuaku	B.Sc., M.Sc.
3	E.U. Asogwa	B.Sc., M.Sc.
4	J.C. Anikwe	B.Sc., M.Sc.
5	Mrs. I.U. Mokwunye	B.Sc.

SOILS & PLANT NUTRITION SCIENTISTS

1	O.S. Ibiremo	B.Sc., M.Sc.
2	R.R. Ipinmoroti	B.Sc., M.Sc.
3	Mrs. C.I. Iloyanomoh	B.Sc., M.Sc.
4	M.O. Ogunlade	B.Sc., M.Sc.
5	M.A. Daniel	B.Sc., M.Sc.
6	A.Alhaji Yabagi	B.Sc.
7	L.A. Adebowale	B.Sc.

S/NO	NAME	QUALIFICATION(S)
	CROP PROCESSING & UTILIZATION SCIENTISTS	
	Dr. O. Olubamiwa	
1	Dr. R. A. Hamzat	B.Sc., M.Sc. & Ph.D
2	Mrs. C. O. Jayeola	B.Sc., M.Sc. & Ph.D
3	L. E. Yahaya	B.Sc. & M.Sc.
4	S. O. Aroyeun	B.Sc. & M.Sc.
5	S. O. Ogunwolu	B.Sc. & M.Sc.
6	M. A. K. Ogunjobi	B.Sc. & M.Sc.
7	A. A. Ajao	B.Sc. & M.Sc.
8	B. Adebowale	B.Sc. & M.Sc.
9	R. O. Igbinadolor	B.Sc. & M.Sc.
10	F. C. Mokwunye	B.Sc. & M.Sc.
11		B.Sc. & M.Sc.

ECONS & STATISTICIANS

1	O. O. Oduwole	B.Sc. & M.Sc.
2	T. R. Shittu	B.Sc. & M.Sc.
3	R. A. Sanusi	B. Agric. M.Sc.
4	K. A. Oluyole	B.Sc. & M.Sc.
5	Mrs. J. O. Lawal	B. Agric. M.Sc.
6	B. O. Obatolu	B. Agric. M.Sc.
7	Mrs. M. Adejumo	B.Sc.

EXTENSION SCIENTISTS

1	Dr. E. O. Aigbekaen	B.Sc., M.Sc. & Ph.D
2	S. O. Adeogun	B.Sc. & M.Sc.
3	E. O. Uwagboe	B.Sc. & M.Sc.
4	E. A. Agbongiarhuoyi	B. Tech. M.Sc.

5	S. Adebiyi	B. Tech.
6	I. Ndagi	B. Agric.

S/NO	NAME	QUALIFICATION(S)
	HEAD OF STATIONS	
1	Dr. S.O. Agbeniyi	Ajassor
2	Mr. T.C.N. Ndubuaku	Owena
3	Dr. S.S. Omolaja	Mambilla
4	Dr. O.O. Oduwole	Ochaja
5	Mrs. U.N. Umeregini	Ibeku
6	Dr. A.O. Famaye	Uhonmora

YEAR 2005 FRESH APPOINTMENT

S/NO	NAMES	DESIGNATION	DEPLOY-MENT	DATE OF ASSUMPT-ION
1	Mrs. I.U. Mokwunye	Research Officer II, HAT 07	Entomology	7/4/05
2	Adishetu Ndasheu	Agric. Field Attd. II, HAT 01	Ochaja	22/9/05
3	Mrs. E.O Onifade	Staff Nurse/Midwife, HAT 07	Health Centre	6/9/05

LEFT THE SERVICE YEAR 2005

S/No	Names	Date of Birth	Date of 1ST Appoint-ment	Date of Retire-ment	Length of Service	Post held at Retirement	Salary Gd. Level
1	Ajibade, R.A.	19/3/46	2/1/70	2/1/05	35	Principal Store Officer	9
2	Ajadi O.O.	12/1/45	20/4/83	12/1/05	22	Asst. Clerical Officer	3
3	Oguntona, M. Mrs.	4/1/48	1/6/69	19/1/05	35	Snr. Health Technician	5
4	Akanji, A	2/2/45	9/12/96	2/2/05	8	Agric. Field Attd.	3
5	Banke, A	2/2/45	1/9/85	2/2/05	19	Snr. Motor Driver	4

6	Okunola, Rufai	20/2/45	21/4/83	20/2/05	22	ACAFO	5
7	Osun S.A	22/11/49	24/2/70	24/02/05	35	Principal Executive Officer	9
8	Udoh, S.U	25/2/45	9/5/73	25/2/05	32	ACAFO	2
9	Odeleye, S.O.	1/5/49	30/7/70	28/2/05	35	Asst. Chief Agric. Supt.	12
10	Essien M	3/3/45	1/2/97	3/3/05	8	Agric. Field Attd.	2
11	Ramoni Raimi	27/3/45	2/5/74	27/3/05	30	ACAFO	5
12	Salako David	1/4/45	30/7/73	1/4/05	32	ACAFO	5
13	Olasupo, E	2/4/45	2/1/96	2/4/05	9	Agric. Field Attd.	3
14	Akintorinwa, F	20/1/47	14/4/70	14/4/05	35	Snr. Foreman	6
15	Kajola, J.O.	22/7/46	14/4/70	14/4/05	35	Executive Officer	6
16	Akintade, S	15/6/45	15/12/71	15/6/05	34	CAFO	6
17	Kosoko, Waidi	17/7/45	20/8/73	17/7/05	32	Chief Printer	6
18	Nwagala, L	10/8/45	17/8/73	10/8/05	32	Snr. Foreman	6
19	Oladokun, F	29/8/45	1/8/89	29/8/05	16	SAFO	4
20	Onipe, J.S	30/12/49	16/9/70	16/9/05	35	Chief Printer	6
21	Oduntan David	20/10/45	16/6/95	20/10/05	10	Asst. Craftsman	3
22	Ayodele S.A	25/12/45	25/4/74	25/10/05	32	Chief Driver	6
23	S.T. Lawal	22/9/54	3/6/77	3/6/05	28	Chief Mec. Driver	6
24	Otitoloju F.A. Mrs.	27/7/48	3/8/71	22/8/05	34	Senior Telephone Supervisor	5
25	O. A. Oladipo	20/4/76	10/8/00	15/8/05	5	Accountant I	
26	S.O. Ojewuyi	5/3/57	14/9/78	15/7/05	27	Snr. Catering Asst.	05
27	P.O. Adebola	23/2/68	10/11/93	27/10/05	12	Asst. Chief Res. Officer	12
28	S.A Asabia	2/8/50	10/9/73	15/8/05	32	Chief Agric. Field Overseer	06
29	F.J. Oloyede	16/6/48	1/2/77	9/9/05	28	Chief Nursing Officer	12
30	O. Oladipupo	11/5/68	1/2/77	23/7/05	8	Agric. Field Attendant I	09
31	A. Esechie	29/12/51	1/12/97	23/7/05	8	Security Guard Gd. I	02
32	G. Nwaokolo		9/12/96	17/8/05	9	Agric. Field Attendant I	03
33	G.W. Williams	3/1/52	25/7/77	18/12/05	28	Chief Typist	08
34	R. Adedeji	5/3/53	1/7/98	7/10/05	7	Craftsman	03
35	M. Olatunbosun	19/11/48	13/1/97	8/12/05	8	Craftsman	03
36	A. B. Olaleye	1/3/52	1/12/77	9/9/05	28	Prin. Conf. Secretary Gd. II	09
37	Sheu Yusuf	3/1/45	17/12/76	3/1/05	29	Chief Motor Driver/Mech	06
38	Olalekan Lawal	12/10/71	18/06/01	25/02/05	4	Agric. Field Overseer	02

YEAR 2005 PROMOTION/ADVANCEMENT
SENIOR STAFF

S/N	Name	Designation & Salary Grade	Date of Prese-nt Appt.	Post to which promotable and Salary Grade	Recommended effect-ive date	Remarks
1	Aliyu, O.M.	Snr. Research Officer, HATISS 9	1/10/02	Princ. Research Officer, HATISS 11	1/10/05	
2	Adedeji, A.R.	Snr. Research Officer, HATISS 9	1/10/02	Princ. Research Officer, HATISS 11	1/10/05	
3	Aikpokpodion, P.O.	Snr. Research Officer, HATISS 9	1/10/02	Princ. Research Officer, HATISS 11	1/10/05	
4	Hamzat, R.A.	Snr. Research Officer, HATISS 9	1/10/02	Princ. Research Officer, HATISS 11	1/10/05	
5	Jaiyeola, C.O. Mrs.	Snr. Research Officer, HATISS 9	1/10/02	Princ. Research Officer, HATISS 11	1/10/05	
6	Ibiremo, O.S.	Snr. Research Officer, HATISS 9	1/10/02	Princ. Research Officer, HATISS 11	1/10/05	
7	Adeyemi, E.A. Mrs.	Snr. Research Officer, HATISS 9	1/10/02	Princ. Research Officer, HATISS 11	1/10/05	
8	Aroyeun, S.O.	Snr. Research	1/10/02	Princ. Research	1/10/05	

		Officer, HATISS 9		Officer, HATISS 11		
9	Yahaya, L.E.	Snr. Research	1/10/02	Princ. Research	1/10/05	
		Officer, HATISS 9		Officer, HATISS 11		
10	Ipinmoroti, R.A.	Snr. Research	1/10/02	Princ. Research	1/10/05	
		Officer, HATISS 9		Officer, HATISS 11		
11	Olaiya, A.O.	Snr. Research	1/10/02	Princ. Research	1/10/05	
		Officer, HATISS 9		Officer, HATISS 11		
12	Hammed, L.A.	Snr. Research	1/10/02	Princ. Research	1/10/05	
		Officer, HATISS 9		Officer, HATISS 11		
		Snr. Research	1/10/02	Princ. Research	1/10/05	
		Officer, HATISS 9		Officer, HATISS 11		
13	Sanusi, R.A.	Snr. Research	1/10/02	Princ. Research	1/10/05	
		Officer, HATISS 9		Officer, HATISS 11		
14	Adeogun, S.O.	Research Officer I, HATISS 8	25/2/02	Senior Research Officer 9	1/10/05	
15	Iloyanomoh, C.I. Mrs.	Research Officer I, HATISS 8	16/4/02	Senior Research Officer 9	1/10/05	
16	Ajao, A.O.	Research Officer I, HATISS 8	8/7/02	Senior Research Officer 9	1/10/05	
17	Ogunjobi, M.A.K.	Research Officer I, HATISS 8	29/7/02	Senior Research Officer 9	1/10/05	
18	Ogunlade, M.O.	Research Officer I, HATISS 8	20/8/02	Senior Research Officer 9	1/10/05	
19	Kolawole, O.	Asst. Chief Lab. Tech. HATISS 12	1/10/01	Chief Lab. Tech. HATISS 13	1/10/05	
20	Omotobora, A	Asst. Chief Lab. Tech. HATISS 12	1/10/01	Chief Lab. Tech. HATISS 13	1/10/05	
21	Ogunbosoye, A.I.	Princ. Lab. Tech. HATISS 11	1/10/01	Asst. Chief Tech. HATISS 12	1/10/05	
22	Borokini, A	Asst. Chief Agric. Supt. HATISS 12	1/10/01	Chief Agric. Supt. HATISS 13	1/10/05	
23	Raji, L.O.	Asst. Chief Agric. Supt. HATISS 12	1/10/01	Chief Agric. Supt. HATISS 13	1/10/05	
24	Efunla, M.S.	Asst. Chief Agric. Supt. HATISS 12	1/10/01	Chief Agric. Supt. HATISS 13	1/10/05	
25	Madehin, R.A.	Asst. Chief Agric. Supt. HATISS 12	1/10/01	Chief Agric. Supt. HATISS 13	1/10/05	
26	Anuforo, G.	Princ. Agric. Supt. I HATISS 11	1/10/01	Asst. Chief Agric. Supt. HATISS 12	1/10/05	
27	Adegbola, O.	Princ. Agric. Supt. I HATISS 11	1/10/01	Asst. Chief Agric. Supt. HATISS 12	1/10/05	
S/N	Name	Designation & Salary Grade	Date of Present Appt.	Post to which promotable and Salary Grade	Recommended effective date	Remarks
28	Adewumi, T.	Princ. Agric. Supt. I HATISS 11	1/10/01	Asst. Chief Agric. Supt. HATISS 12	1/10/05	
29	Adeyemo, G.O.	Princ. Agric. Supt. I HATISS 11	1/10/01	Asst. Chief Agric. Supt. HATISS 12	1/10/05	
30	Eguntola, F.	Princ. Agric. Supt. II HATISS 9	1/10/01	Princ. Agric. Supt. I HATISS 11	1/10/05	
31	Kuforiji, D.K.	Higher Agric. Supt. HATISS 7	1/4/01	Snr. Agric. Supt. HATISS 8	1/10/05	
32	Mari, A.	Asst. Agric. Supt. HATISS 5	26/6/01	Agric. Supt. HATISS 6	1/10/05	
33	Imade, C.O.	Asst. Agric. Supt. HATISS 5	6/12/01	Agric. Supt. HATISS 6	1/10/05	
34	Taiwo, L.L.	Asst. Chief Agric. Field Overseer, HATISS 5	1/10/01	Chief Agric. Field Overseer HATISS 6	1/10/05	
35	Nwachukwu, J.	Asst. Chief Agric. Field Overseer, HATISS 5	1/10/01	Chief Agric. Field Overseer HATISS 6	1/10/05	
36	Alamu, M.O.	Asst. Chief Agric.	1/10/01	Chief Agric. Field	1/10/05	

		Field Overseer, HATISS 5		Overseer HATISS 6		
37	Beka, S.E.	Asst. Chief Agric. Field Overseer, HATISS 5	1/10/01	Chief Agric. Field Overseer HATISS 6	1/10/05	
38	Udoh, M.F.	Asst. Chief Agric. Field Overseer, HATISS 5	1/10/01	Chief Agric. Field Overseer HATISS 6	1/10/05	
39	Ajayi, S.O.	Asst. Chief Agric. Field Overseer, HATISS 5	1/10/01	Chief Agric. Field Overseer HATISS 6	1/10/05	
40	Ojo, A.I.U.	Asst. Chief Agric. Field Overseer, HATISS 5	1/10/01	Chief Agric. Field Overseer HATISS 6	1/10/05	
41	Orobiyi, J.	Asst. Chief Agric. Field Overseer, HATISS 5	1/10/01	Chief Agric. Field Overseer HATISS 6	1/10/05	
42	Omole, J.	Asst. Chief Agric. Field Overseer, HATISS 5	1/10/01	Chief Agric. Field Overseer HATISS 6	1/10/05	
43	Bakare, A.	Asst. Chief Agric. Field Overseer, HATISS 5	1/10/01	Chief Agric. Field Overseer HATISS 6	1/10/05	
44	Olawale, I.	Asst. Chief Agric. Field Overseer, HATISS 5	1/10/01	Chief Agric. Field Overseer HATISS 6	1/10/05	
45	Owor, O.A.	Asst. Chief Agric. Field Overseer, HATISS 5	1/10/01	Chief Agric. Field Overseer HATISS 6	1/10/05	
46	Kpeleye, R.	Asst. Chief Agric. Field Overseer, HATISS 5	1/10/01	Chief Agric. Field Overseer HATISS 6	1/10/05	
47	Ononiwu, A.	Asst. Chief Agric. Field Overseer, HATISS 5	1/10/01	Chief Agric. Field Overseer HATISS 6	1/10/05	
48	Emaku, Leo	Snr. Statistical Officer HATISS 8	1/10/01	Princ. Statistical Officer HATISS 9	1/10/05	
49	Busari, L.A.	Snr. Statistical Officer HATISS 8	1/10/99	Princ. Statistical Officer HATISS 9	1/10/05	
50	Fagbami, O.O.	Asst. Chief Librarian HATISS 12	1/10/01	Chief Librarian	1/10/05	
S/N	Name	Designation & Salary Grade	Date of Present Appt.	Post to which promotable and Salary Grade	Recommended effective date	Remarks
51	Oyedotun, G.	Snr. Printer HATISS 5	1/10/01	Chief Printer HATISS 6	1/10/05	
52	Dimowo, P.A. Miss.	Snr. Admin. Officer HATISS 9	1/10/02	Princ. Admin. Officer HATISS 11	1/10/05	
53	Onatunde-Onauga, J.O.	Admin. Officer I HATISS 8	1/10/02	Snr. Admin. Officer HATISS 9	1/10/05	
54	Oguntona, K.W.	Admin. Officer I HATISS 8	1/10/02	Snr. Admin. Officer HATISS 9	1/10/05	
55	Adejoro, M. Mrs.	Admin. Officer II HATISS 7	6/2/02	Admin. Officer I HATISS 8	1/10/05	
56	Akanni, A.S.B.	Princ. Accountant HATISS 11	1/10/02	Asst. Chief Accountant HATISS 12	1/10/05	
57	Fabowale, K.M.	Snr. Accountant HATISS 9	1/10/02	Princ. Accountant HATISS 11	1/10/05	
58	Ogunkanmi, D.A. Mrs.	Princ. Exec. Officer HATISS 11	1/10/01	Asst. Chief Exec. Officer 1 HATISS 12	1/10/05	
59	Adewumi, A.	Princ. Exec. Officer	1/10/01	Princ. Exec. Officer	1/10/05	

		II HATISS 9		1 HATISS 11	
60	Adebambo, F.T. Mrs.	Princ. Exec. Officer II HATISS 9	1/10/01	Princ. Exec. Officer 1 HATISS 11	1/10/05
61	Agwimah, J.A.	Higher Exec. Officer HATISS 7	16/11/00	Snr. Exec. Officer HATISS 8	1/10/04
62	Farinola, P.A.	Higher Exec. Officer HATISS 7	5/12/00	Snr. Exec. Officer HATISS 8	1/10/04
63	Kuforriji, E.O.	Higher Exec. Officer HATISS 7	29/6/01	Snr. Exec. Officer HATISS 8	1/10/05
64	Onifade, A.O.	Higher Exec. Officer HATISS 7	3/8/01	Snr. Exec. Officer HATISS 8	1/10/05
65	Olubodun, O.O. Miss.	Executive Officer HATISS 6	1/10/01	Higher Exec. Officer HATISS 7	1/10/05
66	Adewusi, E.M.A. Mrs.	Exec. Officer HATISS 6	1/10/01	Higher Exec. Officer HATISS 7	1/10/05
67	Adeyemi, S.O.	Snr. Clerical Officer HATISS 5	1/10/02	Chief Clerical Officer HATISS 6	1/10/05
68	Togun, K.O.	Snr. Clerical Officer HATISS 5	1/10/01	Chief Clerical Officer HATISS 6	1/10/05
69	Ayoade, O.	Snr. Clerical Officer HATISS 5	1/10/01	Chief Clerical Officer HATISS 6	1/10/05
70	Fagbemi, D.O. Mrs.	Snr. Typist I HATISS 7	1/10/01	Chief Typist HATISS 8	1/10/05
71	Morakinyo, R.A. Mrs.	Snr. Typist II HATISS 6	1/10/01	Snr. Typist I HATISS 7	1/10/05
72	Ogbechie, M.O. Mrs.	Snr. Typist II HATISS 6	1/10/01	Snr. Typist I HATISS 7	1/10/05
73	Ogunsola, G.B. Mrs.	Snr. Typist II HATISS 6	1/10/01	Snr. Typist I HATISS 7	1/10/05
74	Adedara, I.B. Mrs.	Typist I , HATISS 5	1/10/01	Snr. Typist II , HATISS 6	1/10/05
75	Adebayo, J.B.	Snr. Tech. Officer HATISS 8	1/10/02	Princ. Tech. Officer II HATISS 9	1/10/05
76	Yinusa, S.A.	Asst. Tech. Officer II HATISS 5	4/12/00	Tech. Officer I HATISS 6	1/10/04
77	Nwodo, E.	Foreman HATISS 5	1/10/01	Snr. Foreman HATISS 6	1/10/05
78	Akintoroye, A.K.	Foreman HATISS 5	1/10/01	Snr. Foreman HATISS 6	1/10/05
79	Ufeogbune, P.	Works Supt. HATISS 6	1/7/02	Higher Works Supt. HATISS 7	1/10/05
80	Oyedotun, T.	Works Supt. HATISS 6	1/10/03	Higher Works Supt. HATISS 7	1/10/05

YEAR 2005 PROMOTION/ADVANCEMENT
JUNIOR STAFF

S.No	Name	Designation	HATISS / Step	Date of Prese-nt Appt.	Post to which Promotable	Salary on prom-otion	Recomm-ended effective date
1	F. WILLIAMS	Snr. Agric. Field Overseer	4/11	1/10/2002	Asst. Chief Agric. Field Overseer	5/6	1/10/205
2	O. OGUNSANYA	Snr. Agric. Field Overseer	4/12	1/1/2003	Asst. Chief Agric. Field Overseer	5/7	1/10/2005
3	MRS. R.O. AKPAN	Agric. Field Overseer	3/9	1/10/2002	Snr. Agric. Field Overseer	4/6	1/10/2005
4	Y. AMUSA	Agric. Field Overseer	3/9	1/10/2002	Snr. Agric. Field Overseer	4/6	1/10/2005
5	B. ALANI	Agric. Field Overseer	3/9	1/10/2002	Snr. Agric. Field Overseer	4/6	1/10/2005

6	J. HARUNA	Agric. Field Overseer	3/9	1/10/2002	Snr. Agric. Field Overseer	4/6	1/10/2005
7	S. ERUGBA	Agric. Field Overseer	3/8	1/10/2002	Snr. Agric. Field Overseer	4/6	1/10/2005
8	O. ONIPE	Agric. Field Overseer	3/7	1/10/2002	Snr. Agric. Field Overseer	4/5	1/10/2005
9	T. GODWIN	Agric. Field Attd. Gd.I	2/8	1/10/2001	Agric. Field Overseer	3/7	1/10/2004
10	J. ADEYEMO	Agric. Field Attd. Gd.I	2/8	1/10/2001	Agric. Field Overseer	3/7	1/10/2004
11	R. ADEDIRAN	Agric. Field Attd. Gd.I	2/8	1/10/2001	Agric. Field Overseer	3/7	1/10/2004
12	A. ONIFADE	Agric. Field Attd. Gd.I	2/8	1/10/2001	Agric. Field Overseer	3/7	1/10/2004
13	M. OSOYOBA	Agric. Field Attd. Gd.I	2/8	1/10/2001	Agric. Field Overseer	3/7	1/10/2004
14	S. UGBESIA	Agric. Field Attd. Gd.I	2/8	1/10/2001	Agric. Field Overseer	3/7	1/10/2004
15	W. FADELE	Agric. Field Attd. Gd.I	2/8	1/10/2001	Agric. Field Overseer	3/7	1/10/2004
15	E. EFFIONG	Agric. Field Attd. Gd.I	2/8	1/10/2001	Agric. Field Overseer	3/7	1/10/2004
17	E.U. EKONG	Agric. Field Attd. Gd.I	2/8	1/10/2001	Agric. Field Overseer	3/7	1/10/2004
18	E. ILOKO	Agric. Field Attd. Gd.I	2/8	1/10/2001	Agric. Field Overseer	3/7	1/10/2004
19	R. AIGBEDION	Agric. Field Attd. Gd.I	2/8	1/10/2001	Agric. Field Overseer	3/7	1/10/2004
20	S. IKHELOA	Agric. Field Attd. Gd.I	2/8	1/10/2001	Agric. Field Overseer	3/7	1/10/2004
21	B. OYELOWO	Agric. Field Attd. Gd.I	2/8	1/10/2001	Agric. Field Overseer	3/7	1/10/2004
22	P. STEPHEN (MRS)	Agric. Field Attd. Gd.I	2/8	1/10/2001	Agric. Field Overseer	3/7	1/10/2004
23	M. NWAJEI (MRS)	Agric. Field Attd. Gd.I	2/8	1/10/2001	Agric. Field Overseer	3/7	1/10/2004
24	S. ADESINA (MRS)	Agric. Field Attd. Gd.I	2/8	1/10/2001	Agric. Field Overseer	3/7	1/10/2004
25	O. ORUNTO	Agric. Field Attd. Gd.I	2/8	1/10/2001	Agric. Field Overseer	3/7	1/10/2004
26	O. AMOO	Agric. Field Attd. Gd.I	2/8	1/10/2001	Agric. Field Overseer	3/7	1/10/2004
27	M.O. ONWUDI (MRS)	Agric. Field Attd. Gd.I	2/8	1/10/2001	Agric. Field Overseer	3/7	1/10/2004
28	B.O. IDOWU	Agric. Field Attd. Gd.I	2/8	1/10/2001	Agric. Field Overseer	3/7	1/10/2004
29	M. DANFULANI	Agric. Field Attd. Gd.I	2/8	1/10/2001	Agric. Field Overseer	3/7	1/10/2004
30	S. REFOR	Agric. Field Attd. Gd.I	2/8	1/10/2001	Agric. Field Overseer	3/7	1/10/2004
31	N. PETER (MRS)	Agric. Field Attd. Gd.I	2/8	1/10/2001	Agric. Field Overseer	3/7	1/10/2004
32	S. MUSA (MRS)	Agric. Field Attd. Gd.I	2/8	1/10/2001	Agric. Field Overseer	3/7	1/10/2004
33	J.I. ETHAOEMI	Agric. Field Attd. Gd.I	2/8	1/10/2001	Agric. Field Overseer	3/7	1/10/2004
34	S. NWEKE	Agric. Field Attd. Gd.I	2/8	1/10/2001	Agric. Field Overseer	3/7	1/10/2004
35	D. ABIADE	Agric. Field Attd. Gd.I	2/7	1/10/2001	Agric. Field Overseer	3/6	1/10/2004
36	HAMMED, I.A.A. (MRS)	Data Processing Asst.	3/ 4	1/10/2002	Snr. Data Processing Asst II	4/2	1/10/2005
37	OLAOYE, M.A.	Clerical Off.I	4/13	1/10/2002	Snr. Clerical Officer	5/8	1/10/2005

38	OAIKHENA, L.I. (MRS)	Clerical Officer I	4/9	1/10/2002	Snr. Clerical Officer	5/4	1/10/2005
39	UMENREGINI, U.	Clerical Officer I	4/7	1/10/2002	Snr. Clerical Officer	5/3	1/10/2005
40	BOLARINDE, F.A. (MRS)	Clerical Officer I	4/10	1/10/2002	Snr. Clerical Officer	5/5	1/10/2005
41	BABATUNDE, J.M. (MRS)	Asst. Clerical Officer	2/8	1/10/2002	Clerical Officer II	3/7	1/10/2005
42	OLABIYI, B.F. (MRS)	Asst. Clerical Officer	2/7	1/10/2002	Clerical Officer II	3/6	1/10/2005
43	AROWOSAFE, F.F. (MRS)	Asst. Clerical Officer	2/13	1/10/2002	Clerical Officer II	3/11	1/10/2005
44	A.Y. SARDAUNA	Asst. Clerical Officer	2/3	1/10/2002	Clerical Officer II	3/3	1/10/2005
45	OYELAMI, R.A.(MRS)	Typist II	4/8	1/10/2000	Typist I	5/4	1/10/2004
46	P. NUMFOR	Typist II	4/3	20/9/2002	Typist I	5/1	1/10/2005
47	AKINOLA, S.	Higher Health Asst.	4/13	1/10/2002	Senior Health Assistant	5/8	1/10/2005
48	CHUKWUMA, J.	Higher Health Asst.	4/13	1/10/2002	Senior Health Assistant	5/8	1/10/2005
49	OTIGBO, O.M. (MRS)	Catering Assistant	4/8	1/10/2002	Senior Catering Assistant	4/5	1/10/2005
50	J. IMOKE	Senior Security Guard	4/13	1/10/2002	Senior Security Guard	5/8	1/10/2005
51	J. AYAMBIM	Senior Security Guard	4/13	1/10/2002	Senior Security Guard	5/8	1/10/2005
52	R.A. LASISI	Security Guard	3/7	1/10/2002	Senior Security Guard	4/7	1/10/2005
53	E.O. ADEKANOLA	Security Guard	3/9	1/10/2002	Senior Security Guard	4/8	1/10/2005
54	S. AKUBO	Security Guard	3/9	1/10/2002	Senior Security Guard	4/6	1/10/2005
55	J. WADA	Security Guard	3/9	1/10/2002	Senior Security Guard	4/6	1/10/2005
56	A. EMMANUEL	Security Guard	3/9	1/10/2002	" "	4/6	1/10/2005
S.No	**Name**	**Designation**	**HATISS / Step**	**Date of Present Appt.**	**Post to which Promotable**	**Salary on promotion**	**Recommended effective date**
57	I. LASISI	Security Guard	3/7	1/10/2002	Senior Security Guard	4/5	1/10/2005
58	A. OJO	Health Watchman	2/9	1/10/2000	Security Guard	3/8	1/10/2004
59	A. OLOTU	Health Watchman	2/9	1/102001	Security Guard	3/8	1/10/2004
60	A. ADUBI	Health Watchman	2/8	1/10/2001	Security Guard	3/7	1/10/2004
61	V. ECHENG	Health Watchman	2/8	1/10/2001	Security Guard	3/7	1/10/2004
62	G. OGBAJI	Health Watchman	2/8	1/10/2001	Security Guard	3/7	1/10/2004
63	S. OKOUJABHOLE	Health Watchman	2/8	1/10/2001	Security Guard	3/7	1/10/2004
64	E. THOMAS	Health Watchman	2/8	1/10/2001	Security Guard	3/7	1/10/2004
65	O. AFOLABI	Health Watchman	2/8	1/10/2001	Security Guard	3/7	1/10/2004
66	S.A. ADEYANJU	Senior Craftsman	4/6	1/10/2002	Foreman	5/2	1/10/2005
67	M. AKINLOYE	Craftsman	3/8	1/10/2001	Senior craftsman	4/5	1/10/2004
68	R. ADEDEJI	Craftsman	3/7	1/10/2001	Senior Craftsman	4/5	1/10/2004
69	A. ADISA	Craftsman	3/6	1/10/2002	Senior	4/4	1/10/2005

					craftsman		
70	T. OYEBANJO	Craftsman	3/6	1/10/2002	Senior Craftsman	4/4	1/10/2005
71	N.E. UDOH	Asst. Craftsman	3/15	1/10/2002	Craftsman	4/11	1/10/2005
72	ASEIN, O.	Senior Store-keeper	4/7	1/10/2002	Asst. Chief Store-keeper	5/3	1/10/2005
73	MIMBA, E.	Senior Motor/Mech. Gd.II	4/7	1/10/2002	Senior Motor/Mech. Gd.I	5/3	1/10/2005
74	S. ADELEKE	Head Messenger	3/8	1/1/2003	Assistant Clerical Officer	3/9	1/10/2005
75	E.O. OBI (MISS)	Head Messenger	3/ 4	1/10/2002	Assistant Clerical Officer	3/5	1/10/2005
76	S. ODUNTAN	Craftsman	3/ 3	1/10/2003	Assistant Technical Officer	5/1	1/10/2005

2005 Annual Report

COCOA PROGRAMME (Leader: Dr. S.O. Agbeniyi)

Title: Host Specificity studies of some insect pests of *Theobroma cacao* (Anikwe, J.C and F.A. Okelana)

Introduction: Intercropping young cocoa farms with cassava and yam caused a rapid invasion and faster establishment of the mealybugs (vectors of CSSV disease), sap-sucking scale insects and rodents (Idowu 1989). Caution should therefore be exercised when intercropping cocoa with other food or tree crops in order not to establish alternate host plants for cocoa pests.

Objective: To identify tree crops that could serve as alternate host plants to insect pests associated with cocoa

Materials and Methods:
Field assessment of host specificity of insect pests of cocoa as well as other tree crops such as kola, coffee and cashew that may serve as alternate hosts started in 2004 and was concluded in 2005. Fifty whole plants were randomly selected and sampled for abundance of common species from each of the four crops. Only insect species that were encountered for relatively long period on cocoa and the associated tree crops either throughout the study period or a whole season were termed common species (Basset, 1999). A species was considered to be a specialist as opposed to a generalist if its

Lloyd index of patchiness was ≥ 3.0 (Lloyd, 1967). Usually this value corresponds to a situation in which 80% of the individuals of the species or its damage were found from the major host plant. Lloyd index (L) was calculated by:

$$L = \frac{Sx^2 - X}{X^2} + 1$$

Where Sx^2 and X are the sample variance and means, respectively. Host specificity for wood boring, sap sucking and leaf chewing activities was observed from pattern of feeding and nature of injury caused on the plant but this did not relate to actual feeding records.

Results and Discussion: Table 1 shows the summary of the host specificity studies of some insect pests of cocoa. *Sahlbergella singularis* was by far the most specialized feeder (L=4.25) despite its occurrence on kola (Table 1). Both nymphs and adults were found ravaging fan branches, chupons, flower cushions, cherelles and pods of cocoa. This was followed by *Bathycoelia thalassina* (L=4.01), which is a pod feeder and closely followed by the cocoa stem borer, *E. myrmeleon* (L=3.95). Other specialist feeders as calculated by the Lloyd's index include *Characoma stictigrapta* (L=3.25), followed by *Earias biplaga* (L=3.15) and cocoa psyllid, *Tyora tessmanni* (L=3.15), and *Anomis leona* (3.05) (Table 2). The implication is that the specialist feeders will feed mainly on cocoa during their active feeding life stage. It showed that the presence of alternate hosts either for the purpose of reproduction, shelter or feeding would play a significant role in the occurrence, distribution and abundance of insect pests of cocoa. For example, the tailor ant, *Oecophylla longinoda* which seemed not to cause any specific damage, the termite species, *Macrotermes natalensis* and the variegated grasshopper, *Zonocerus variegatus* were by far the most abundant and classified generalist whereas the population of *Bathycoelia thalassina* which was the lowest was classified as a specialist feeder (Table 1). This suggests therefore that the population of alternate hosts will greatly influence the extent to which a generalist will inflict damage on cocoa.

Table 1: Abundance (number) and Lloyd index of patchiness of common species foraging cocoa and selected tree crops in Ibadan, Nigeria

	Mean number of insects found per 50 trees					
Insect pest	**cocoa**	**kola**	**coffee**	**cashew**	**Lloyd index Of patchiness**	**feeding classification**

Sahlbergella singularis	15	2	0	0	4.25	specialist
Eulophonotus myrmeleon	12	0	0	0	3.59	specialist
Anomis leona	11	13	0	0	3.05	specialist
Characoma stictigrapta	9	5	0	0	3.25	specialist
Zonocerus variegatus	32	16	43	36	1.56	generalist
Earias biplaga	14	9	0	0	3.15	specialist
Macrotermes natalensis	16	17	22	15	2.07	generalist
Bathycoelia thalassina	5	0	0	0	4.01	specialist
*Oecophylla longinoda	35	44	30	38	1.47	generalist
Tyora tessmanni	21	0	0	0	3.15	specialist

* no specific damage to plants was observed

Reference:

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Lloyd, M. (1967): Mean crowding. *Journal of animal Ecology*, **36**: 1 - 30.

2005 ANNUAL REPORT

Title: Mycoflora of cocoa beans in Nigeria

(Dongo, L. N.)

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INTRODUCTION

Cocoa (*Theobromae cacao* L.) has been grown in Nigeria since the 19th Century and is presently the world's fourth largest producer accounting for approximately 6% of the world production (ICCO, 2003). The production of cocoa in Nigeria has witnessed a downward trend and several factors relating to quality and quantity have been implicated. The quality problem of Nigerian cocoa has been in existence since the 1970's, even during the time of Nigerian Cocoa Board (NCB). Cocoa Board sorted out bad quality, sold selected beans when market price was best and paid farmers what was decided upon. During the era of liberalization in 1986, more people entered the export trade without adequate preparation while the whole structure of NCB was dismantled without a substitute. The problem is presently accentuated by the possible presence of ochratoxin A (OTA), produced by certain spp of *Aspergillus* and *Penicillium.*

Mycotoxins are toxic secondary metabolites of fungal origin, which when ingested, inhaled or absorbed through the skin cause lowered performance, sickness or death in human and animals. Contamination of agricultural produce with mycotoxins can present serious problems, both for human health and the economic value of crops. They develop naturally in a variety of plant products either in crop production or in storage, where drying technology may be preventative. The growth of the mould and the subsequent production of mycotoxins are dependent upon a number of factors such as temperature and humidity during the growth, harvesting, processing and subsequent drying and storage of the crop.

Nigeria has a tropical climate with all year round high ambient temperature and relative humidity that provide optimal condition for the growth of mycotoxigenic molds.
In Nigeria, cocoa pods are harvested during September – November when rainfall is at its peak. The pods are broken in the fields and the wet seeds are transported from the field to the homesteads for fermentation. Some of these practices may enhance the growth of the mycotoxin producing fungi such as *A. flavus, A. ochraceus, Fusarium* spp and *Penicillium* spp. There is lack of information on the types and effects of mycotoxin producing fungi on cocoa beans in Nigeria as well as the frequency of occurrence of these molds. An understanding of the predominant fungi in cocoa beans is a pre-requisite to reducing mycotoxin risks in human and animal health.

This study therefore aims to determine the frequency of occurrence of possible mycotoxin producing fungi in cocoa beans produced in Nigeria.

MATERIALS AND METHODS

Survey and sample collection

Cocoa bean samples were collected during a survey of cocoa farmers post harvest practices in four states of Nigeria namely Cross Rivers, Ondo, Taraba and Edo. The survey spanned from September – December 2005. Freshly dried cocoa bean samples were collected from cocoa farmers and placed in brown paper bags. The beans were stored at 4^0C in the Laboratory until required.

Isolation and Identification

Five cocoa bean samples were taken as representative samples from each paper bag. The beans were surface sterilized in 10% sodium hypochlorite for five minutes and then rinsed in two changes of water. Thereafter, the cocoa beans were plated on Dichloran Rose Bengal Chloramphenicol media and incubated at 30^{o}C for five-seven days. Pure cultures were isolated on Czapeks Yeast Agar. Identification of the Aspergilla were done according to the procedures of klich and Pitt (1988) while Fusaria and Penicillia were identified to generic level only.

Statistical Analysis
Statistical Package for Social Sciences (SPSS) was used to determine the frequency of occurrences of isolated fungi on cocoa beans.

RESULTS AND DISCUSSION
Seven fungal genera were isolated out of the 328 cocoa bean samples. *Aspergillus* was the most frequently isolated genus. It occurred in 75% of the samples comprising 46.3% of total genera isolated (Fig. 1). Of the *Aspergillus*, 7 species were isolated of which *A.flavus* (74.1%) and *A. tamarii* (18.5%) were the most prevalent species followed by *A. oryzae* (3.9%). The remaining species *A. parasiticus* (1.4%), *A. niger* (1.2%) *A. sojae* (0.7%) were less frequently isolated, while *A. ochraceus* was isolated from one cocoa bean sample giving a percentage of 0.2% (Fig. 2). *Fusarium* ranked second in the number of cases of isolation (36.8%) while *Rhizopus* (9.0%) and *Penicillium* (5.6%) followed. The other genera isolated include *Sclerotium* (1.2%), *Botryodiplodia* (0.6%) and *Mucor* (0.5%) (Fig. 1).

Several investigators have reported similar fungal incidences on different crops. Hasen and Abdel-Sater (1993) studied the Mycoflora and Aflatoxin in regular and decaffeinated Black tea and indicated that *Aspergillus* was isolated in all samples comprising 92.3% of total fungi. Their results equally showed that *A. flavus* was the most commonly encountered. On the fungal contamination of fruits and vegetables, Peter *et al* (1990) reported *Aspergillus* as the most frequently encountered genera in 95% of the samples. In Egypt, Abdel-Sater and Saber (1999) found that Penicillium species were isolated in low frequency from dry raisins (35%) and dates (30%).

In Nigeria, cocoa pods are harvested during September-November when rainfall is at its peak. The pods are transported from the field to the homesteads, pods are broken, and the beans removed for fermentation. Some of these practices may enhance the growth of the mycotoxin producing fungi such as *A. ochraceus* and *A. flavus*, *Fusarium* as well as *Penicillium* spp.

CONCLUSION

This study has shown that the cocoa beans were contaminated with several fungi especially members of *Aspergillus*, *Penicillium Fusarium* and *Rhizopus*. Many of these fungi are capable of producing mycotoxins such as aflatoxins, fumonisin, zearalenone and ochratoxin A. Most isolated organisms are typical mycotoxin producers on different crops. *A. flavus* and *A.parasiticus* produce aflatoxins while *A. niger* and *A.ochraceus* are ochratoxin A (OTA) producers. Cyclopiazonic and 3-nitropropionic acid are produced by *A. oryzae* and *A.flavus*. Most *Penicillium* spp produce OTA, patulin, mycophenolic acid etc while *Fusarium* spp produce fumonisins, deoxynivalenol, zearalenone etc.
These finding indicate that there may be a risk of human exposure to mycotoxins through the consumption of cocoa beans and by-products. Urgent attention is therefore needed towards reduction of the microbial load of the cocoa beans. This can be achieved by implementing good agricultural practices (GAP) from field to fork. It will require our collective efforts in terms of training and awareness creation amongst the citizenry especially cocoa farmers. Again, evaluation of the mycotoxin potentials of these isolated organisms is required.

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Parazitol Epidemiol Pneumoftizol Ser, 39:31-37

Title of Project	**"Cocoa Productivity and Quality Improvement: A Participatory Approach"**
Name/address of collaborating institution	COCOA RESEARCH INSTITUTE OF NIGERIA, PMB 5244 IBADAN NIGERIA
Name of project coordinator(s)	Technical: AIKPOKPODION Peter Administrative Coordinator: Prof. G. O. IREMIREN
Period covered by work plan	Year 2: First Six-month (June – November 2005)
Author (s) of Report	Peter O. AIKPOKPODION
Date of submission	6 February 2006
IPGRI Project Implementation Agreement (PIA) number	LOA COCOA/11/2004

Name & function of project staff involved	*Names:*	*Functions:*	
	P.O. AIKPOKPODION	Technical Coordinator & Cocoa Breeder/ Geneticist	75%
	S. O. AGBENIYI	Plant Pathologist	15%
	S. S. OMOLAJA	Plant Breeder	15%
	P. O. ADEBOLA	Plant Breeder	15%
	O. M. ALIYU	Plant Breeder	15%
	F. E. OKELANA	Entomologist	10%
	J. C. ANIKWE	Entomologist	20%
	H. OTUNOYE	Plant Pathologist	20%
	L. O. RAJI	Agric. Superintendent	95%
	R. ONILEMO	Agric. Superintendent	95%
	K. ADIO	Laboratory Technologist	15%
	OIC Owena Substation	Agric. Superintendent	10%
	OIC Ajassor	Agric. Superintendent	10%
	OIC Ibeku	Agric. Superintendent	10%
	OIC Uhonmora	Agric. Superintendent	10%

Abstract (150-200 words)

The outputs of the first six months of year 2 include: A. Field planting of 1. Regional Variety Trial (Six blocks of 22 genotypes + two local control crosses), 2. Farmer Selection Observation Plot consisting of 151 accessions in two blocks of two trees each and, 3. 6 x 6 Factorial Trial in two agro-ecological zones. B. Pollination of selected 15 crosses for the On-Farm Variety Trial. C. Preliminary analysis of Farm survey data. D. Observations made on Hybrid Trial 1 Progenies for yield performance. E. Further analysis of genetic diversity of cocoa collections in Nigeria. F. Resistance screening of farmer and genebank collections. G. Further evaluation of Hybrid Trial 1 progeny crosses for reaction to mirid attack.

Annex 1. Summary of results obtained during the reporting period (June 2005 – November 2005)

Code	**Description of activity and of sub-activities (as in work plan)**	**Quantifiable Outputs for Year 1** (number of accessions planted, number of farms visited, etc)	**Degree of advancement** (On schedule, Delayed, Postponed)	Comments (justification for any changes)
1.1.1	Survey on planting material present at farms and on criteria applied by	Data collected is being analyzed.	On Schedule	

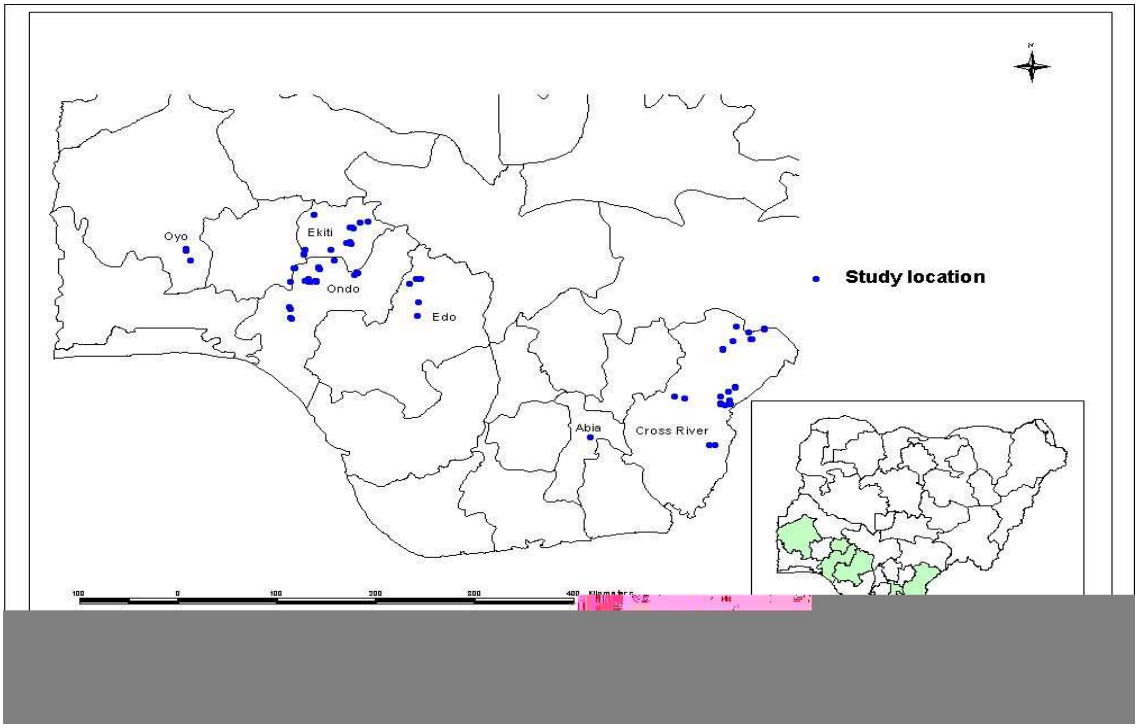
	farmers for choosing new planting materials in their farms. Analysis of data.			
1.1.2	Identification and collection (as grafts or open pollinated seedlings established in a nursery) of promising mother plants in farmers populations according to selection criteria applied by farmers and researcher.	No new collection made yet	Delayed	1. Collection is to be concentrated on unique accessions revealed by molecular studies. 2. Inadequate fund for this activity
1.2.1	Establishment of multi-location on-farm variety trials in three cocoa growing ecological areas of Nigeria. One replicate contains rows of 10 plants of each of 20 hybrid genotypes Locations: ideal climate, ideal soil and marginal climate ecologies	Some 48-farm locations have been identified for the trial. Pollination was made for some 15 genotypes from station (and 5 farmer selections making a total of 20 genotypes) have been selected from the Hybrid Trial 1 and other promising crosses for the trial (Attache 1a -1c). Some 25 farms are being planned for establishment during the next rainy season.	On schedule	
1.3.1	Nursery multiplication, field planting and maintenance of interesting planting materials collected in farmers field in observation plots on-station.	Two trees each of 151 accessions from 28 groups were successfully established in two blocks (Attache 2). Some 2,181 successful grafts were obtained from 5,855 grafts made in the nursery.	On schedule	
1.3.2	Preliminary evaluation through field observations in observation plots and by using available early resistance screening tests of materials collected in farmers field and control variety	Some 56 farmer and genebank materials were screened with N38 and C77 controls (Attache 3). Some 26 accessions had lower disease scores than C77 resistant control.	On schedule	
1.3.3	Study of genetic diversity of accessions collected in farmers field using SSR markers	A further analysis indicated that while West African Amelonado made only about 9.0%, F3 Amazon, 13.0 %, their hybrid population made 75.0% of total collection.	On schedule	
1.4.1	Visits of project personnel between project sites to attend: a) National Stakeholder Workshops in neighbouring countries, and b) Regional Coordination Meetings of National Technical Coordinators	No visit made	On schedule	
1.4.2	Organization of national stakeholders' planning workshop for decision on procedures for participatory selection	No activity	On schedule	

	of new varieties and on-farm selection trials. Identify which stakeholders will participate and how many participants are expected		
	COMPONENT 2		
2.1.1	a. Detailed evaluation of the international clone trial (ICT) established in the CFC/ICCO/IPGRI project on Cocoa Germplasm Utilization and Conservation for productivity and field resistance	Observations were made on Hybrid Trial 1 for yield performance. Evaluation for mirid resistance was carried out.	On schedule
	b. Maintenance and evaluation of Local Clone Trials (LCT), Clone observation plots (LCOP), Hybrid Trials and populations (for vigour, yield, resistance, quality).		
2.1.2	Validation at national level of most interesting clones and hybrid varieties on-station, selected under 2.1.1.	Some 36 crosses derived from a 6 x 6 factorial mating were partially planted as 10 trees/cross in four blocks at Ajassor station in Cross River State and two blocks at Ibadan station.	On schedule
2.1.3	Validation of varieties in Regional Variety Trials in Africa(15 hybrids). Reception of seed or budwood, nursery and field establishment	Field planting of 1.4 ha land area carried out for RVT in six blocks of 20 genotypes planted at 10 trees per genotype per block including two control crosses (F3 open pollinated and another local cross)	On schedule
2.4.2	Calonectria studies aiming at screening for mirid resistance.	Observations are being made on lesions and damage caused by mirids on some Hybrid Trial 1 genotypes. Fungal isolations are being made from lesions and feeding points. *Fusarium* spp. and *Lasiodiplodia* spp. have been isolated in the laboratory.	On schedule
2.3.2	Selected germplasm received from intermediate quarantine established in nursery and in field collections in user countries:	Some 23 clones established in budwood garden. No new introduction made.	On schedule
	a. CFC/ICCO/IPGRI Project Collection		
	b. Enhanced germplasm populations		
	c. Other selections		

Attache 1a. Some 48 farm locations in 25 communities where contact has been made to establish on-farm trials in all three cocoa growing cocoa ecological zones of Nigeria

Ecology	**State**	**No Communities**	**No Plots (Farms)**	**Communities**
Ideal Climate (IDC)	Ondo	7	14	Akure North, Ibule, Owo, Bolorunduro, Ile-Oluji, Owena, Idogun
IDC	Edo	3	6	Ozalla, Ikhin, Otuo
IDC	Ekiti	2	4	Ogotun, Ode
Marginal	Osun	2	4	Ikoromaja, Omifunfun
Marginal	Oyo	2	4	Adebayo, Akinyele
Ideal Soil	Cross River	7	14	Abia, Bendeghe, Etomi, Nsofang, Ikom, Boki, Effraya
Ideal Soil	Abia	2	2	Bende
	Total	25	48	

Attache 1b. Map showing locations of on-farm trial sites identified in all three cocoa growing cocoa ecological zones of Nigeria



Attache 1c. No of pods produced for each of 15 hybrid progeny crosses planned for on-farm variety trial in Nigeria

Hybrid cross	**Pedigree**	**No. pods**	**Ready in 2005/2006**
T65/7 x T22/28	Amazon/Trinitario	30	Nov/Dec
T101/15 x N38	Amazon/Amelonado	28	Nov/Dec
T65/7 x T9/15	Amazon/Trinitario	15	Nov/Dec
T86/2 x T9/15	Amazon/Trinitario	17	Nov/Dec
T65/7 x T101/15	Amazon/Amazon	31	Nov/Dec
T86/2 x T16/17	Amazon/Amazon	33	Nov/Dec
T65/7 x N38	Amazon/Amelonado	7	Nov/Dec
T82/27 x T12/11	Amazon/Amazon	44	Nov/Dec
T53/5 x N38	Amazon/Amelonado	2	Nov/Dec
T86/2 x T57/22	Amazon/Criollo	15	Nov/Dec
T86/2 x T22/28	Amazon/Trinitario	9	Nov/Dec
P7 x PA150	Amazon/Amazon	24	Dec/Jan
C77 x C67	Amazon/Amazon (Control)	77	Dec/Jan
ICS1 x SCA6	Amazon/Trinitario	34	Dec/Jan
N38 x MXC 67	Amelonado/Amelonado	1	Nov/Dec

Attache 2. Summary of 151 accessions planted of 28 accession groups in Farmer Selection Observation Plot (FSOP) in Nigeria

Accession family	**No.**		**Accession family**	**No.**
AJS	5		CESA	6
ODG	9		AKP	1
IKM	5		OBR	5
AMEL	2		IKJ	2
BOK	16		OGT	2
ETG	27		GBON	1
FDR	3		AKS	1
BEK	14		WAC	3
OWY	8		IDR	5
BND	5		OWO	4
IRE	1		OBD	4
ODE	2		BAMK	8
CTIS	7		ETM	1
AJB	1		CSA	3

Attache 3. Mean disease rating for resistance screening done for some farmer selection and field genebank materials.

SNK Grouping										Mean	N	Genotype
					A					4.6083	12	IFE1
					A							
		B			A					4.4250	12	OWY4
		B			A							
		B			A		C			4.2333	12	ETG5
		B			A		C					
		B		D	A		C			4.2000	12	OWY5
		B		D	A		C					
E		B		D	A		C			4.1167	12	IKJ6
E		B		D	A		C					
E		B		D	A		C		F	4.0583	12	OWY15
E		B		D	A		C		F			
E		B		D	A		C		F	4.0000	12	AJB3
E		B		D	A		C		F			
E		B		D	A		C		F	3.9417	12	N38
E		B		D	A		C		F			
E		B		D	A	G	C		F	3.8083	12	BEK79_22
E		B		D		G	C		F			
E		B		D	H	G	C		F	3.7167	12	ETG2
E		B		D	H	G	C		F			
E		B		D	I	H	G	C	F	3.6417	12	IFE6
E		B		D	I	H	G	C	F			
E		B	J	D	I	H	G	C	F	3.5667	12	IKM13
E			J	D	I	H	G	C	F			
E		K	J	D	I	H	G	C	F	3.4667	12	ETG59
E		K	J	D	I	H	G		F			
E		K	J	D	I	H	G	L	F	3.3500	12	OWY3
E		K	J		I	H	G	L	F			
E		K	J	M	I	H	G	L	F	3.2500	12	IKM16
		K	J	M	I	H	G	L	F			
		K	J	M	I	H	G	L	F	3.2333	12	IKM7
		K	J	M	I	H	G	L	F			
		K	J	M	I	H	G	L	F	3.2000	12	OWY6
		K	J	M	I	H	G	L	F			
N		K	J	M	I	H	G	L	F	3.1750	12	IFE3
N		K	J	M	I	H	G	L				
N		K	J	M	I	H	G	L	O	3.0333	12	OWY8
N		K	J	M	I	H	G	L	O			
N	P	K	J	M	I	H	G	L	O	2.9818	11	OWY7
N	P	K	J	M	I	H	G	L	O			
N	P	K	J	M	I	H	G	L	O	2.9333	12	ODE1
N	P	K	J	M	I	H	G	L	O			
N	P	K	J	M	I	H	G	L	O	2.9167	12	CSA1
N	P	K	J	M	I	H	G	L	O			
N	P	K	J	M	I	H	G	L	O	2.9167	12	ETG1
N	P	K	J	M	I	H		L	O			
N	P	K	J	M	I	H		L	O	2.8750	12	IKM17
N	P	K	J	M	I	H		L	O			
N	P	K	J	M	I	H		L	O	2.8750	12	ETG6
N	P	K	J	M	I	H		L	O			
N	P	K	J	M	I	H	Q	L	O	2.8083	12	AJS4
N	P	K	J	M	I		Q	L	O			
N	P	K	J	M	I	R	Q	L	O	2.7417	12	IFE4
N	P	K	J	M		R	Q	L	O			
N	P	K	J	M	S	R	Q	L	O	2.6667	12	AYD3
N	P	K		M	S	R	Q	L	O			
N	P	K		M	S	R	Q	L	O	2.6083	12	CSA7
N	P			M	S	R	Q	L	O			
N	P	T		M	S	R	Q	L	O	2.4300	10	BOK25
N	P	T		M	S	R	Q		O			
N	P	T		M	S	R	Q	U	O	2.3583	12	ODE3
N	P	T			S	R	Q	U	O			
N	P	T		V	S	R	Q	U	O	2.2667	12	C77
N	P	T		V	S	R	Q	U	O			
N	P	T		V	S	R	Q	U	O	2.2583	12	IKJ3
N	P	T		V	S	R	Q	U	O			
N	P	T		V	S	R	Q	U	O	2.2583	12	ETG21
	P	T		V	S	R	Q	U	O			
	P	T		V	S	R	Q	U	O	2.1900	10	ETG45
	P	T		V	S	R	Q	U	O			
W	P	T		V	S	R	Q	U	O	2.1100	10	ETG34
W	P	T		V	S	R	Q	U				
W	P	T		V	S	R	Q	U	X	2.0500	10	AMEL2
W	P	T		V	S	R	Q	U	X			
W	P	T		V	S	R	Q	U	X	2.0400	10	ETM2
W		T		V	S	R	Q	U	X			
W		T	Y	V	S	R	Q	U	X	1.9400	10	OBR9
W		T	Y	V	S	R	Q	U	X			
W		T	Y	V	S	R	Q	U	X	1.9200	10	OBD10
W		T	Y	V	S	R	Q	U	X			
W		T	Y	V	S	R	Q	U	X	1.9100	10	ETG37
W		T	Y	V	S	R	Q	U	X			
W		T	Y	V	S	R	Q	U	X	1.8800	10	BOK29
W		T	Y	V	S	R	Q	U	X			
W		T	Y	V	S	R	Q	U	X	1.8750	12	IKJ4
W		T	Y	V	S	R		U	X			
W		T	Y	V	S	R		U	X	1.8600	10	OBR17
W		T	Y	V	S	R		U	X			

W	T	Y	V	S	R	U	X	1.8300	10	BOK21
W	T	Y	V	S	R	U	X			
W	T	Y	V	S	R	U	X	1.8200	10	AMEL1
W	T	Y	V	S		U	X			
W	T	Y	V	S		U	X	1.7417	12	AJS3
W	T	Y	V	S		U	X			
W	T	Y	V	S		U	X	1.7250	12	CSA4
W	T	Y	V			U	X			
W	T	Y	V			U	X	1.5583	12	ETG20
W	T	Y	V			U	X			
W	T	Y	V			U	X	1.5250	12	CSA14
W		Y	V			U	X			
W		Y	V		Z	U	X	1.4100	10	BOK30
W		Y	V		Z		X			
W		Y	V		Z		X	1.3818	11	ETG4
W		Y	V		Z		X			
W		Y	V		Z		X	1.3100	10	BOK27
W		Y			Z		X			
W		Y			Z		X	1.2300	10	ETG36
W		Y			Z		X			
W		Y			Z		X	1.2200	10	ETG38
		Y			Z		X			
		Y			Z		X	1.1000	12	CSA6
		Y			Z					
		Y			Z			1.0417	12	ETG17
					Z					
					Z			0.6700	10	OBD9

Means with the same letter are not significantly different.

COCOA RESEARCH PROGRAMME
2005 ANNUAL REPORT
(Leader: Dr. S.O. Agbeniyi)

Experimental Title: Effect of pod size, bean position on seed germination and growth of cocoa seedlings (Theobroma cacao) in Nigeria (Famaye, A.O.; Iremiren, G.O.; Oloyede, A.A.).

Introduction: The establishment of National Cocoa Development Committee (NCDC) has led to a greater awareness on cocoa production and consequently pressure on the Institute for supply of planting materials (pods or seedlings). Seedlings are produced in the nursery by sowing of viable seeds in polythene bags 30cm x 12.5cm. The seedlings are raised for about 6 months before transplanting to the field. The growth and vigour of the seedlings to a large extent determines their eventual performance on the field.

Objective: The objective of this study is to evaluate the effect of pod size and position of the beans in the pod on seed germination and seedling performance.

Materials and methods: Pod were harvested from Northern block of the Institute (Zone 1) in April, 2004. The pods were weighed and grouped into three categories of big, medium and small as presented in Table 1. The pods were broken laterally and the beans extracted from the posterior, middle and anterior positions. The experiment therefore was factorial in a completely randomized design consisting of factor A (pod size) and B (bean position). The two factors are at three levels each resulting in nine treatment combinations. There were three replicates. The two factors were designated thus : factor A (pod size): Pa (Big pod), Pb (Medium pod) and Pc (Small pod)

Factor B (bean position): Bp (posterior position); Bm (middle position) and Ba (anterior position)

Table 1: Mean pod size and their corresponding number

	Pod size (g)	Number of beans/pod
Big	590.9	49.5
Medium	414.7	45.2
Small	181.6	23,8

Results and Discussion: Table 2 shows the percentage germination while Table 3 shows the growth parameter for the different treatment combinations (height, girth, number of leaves and leaf area)

Table 2: Percentage germination

	Days after sowing	
	14	21
PaBp	73.3	86.7
PaBm	53.3	86.7
PaBd	40.0	93.3
PaBp	40.0	66.7
PbBm	40.0	100.0
PbBd	40.0	93.3
PcBp	40.0	100,0
PcBm	66.7	73,3
PcBd	66.7	93,3

Table 3: Mean growth parameters (Height, girth, number of leaves and Leaf area)

Treatments	Months After Sowing											
	2				4				6			
	Ht (cm)	*Gt* (cm)	*NL*	*LA* (cm^2)	*Ht* (cm)	*Gt* (cm)	*NL*	*LA* (cm^2)	*Ht* (cm)	*Gt* (cm)	*NL*	*LA* (cm^2)
PaBp	9.39	0.32	5.2	69.02	11.72	0.38	4.9	72.21	14.47	0.43	7.3	113.43
PaBm	16.49	0.44	7.9	90.47	19.24	0.64	9.7	119.40	23.90	0.66	13.1	84.63
PaBd	13.85	0.41	7.7	84.14	17.07	0.62	9.5	108.16	21.19	0.65	12.1	86.57
PbBp	13.59	0.40	6.9	63.86	15.11	0.59	8.9	73.94	19.51	0.60	12.0	137.24
PbBm	14.11	0.41	8,2	83.40	16.97	0.57	9.8	90.78	21.02	0.63	13.7	110.95
PbBd	16.13	0.43	7.7	93.64	17.57	0.62	9.7	79.52	21.19	0.64	11.9	109.69
PcBp	17.07	0.45	7.5	82.48	19.57	0.60	9.7	112.44	23.95	0.63	12.8	100,51
PcBm	14.26	0.36	6.6	55.37	16.53	0.56	9.3	86.09	20.19	0.57	13.3	91.74
PcBm	12.57	0.34	6.3	55.82	14.85	0.51	8,3	74.56	18.58	0.53	10.7	65.82
Mean	14.16	0.40	7.11	75.36	16.51	0.56	8.87	90.79	19,44	0.59	11.88	114.94
LSD	1.76	0.05	0.72	11.02	1.81	0.05	1.18	13.69	2.04	0.07	1.47	10.09

Table 2 revealed that average weight of pods are 590.9g (big), 414.7g (medium) and 181.6g (small) while the average number of beans per pod are 49.5 (big); 45.2 (medium) and 23.8 (small).

Germination as at 21st day of sowing revealed that beans from small pods (posterior end) and from medium pods (middle position) attained 100 percent germination. This is a good indication that beans extracted from small sized pods are as viable as bigger sized pods or even better. Growth parameters also followed similar trend as above where small sized pods (posterior end) had better or similar growth with the bigger sized pods.

It is instructive from this study that beans obtained from small sized pods are as reliable or better than those from other size categories with posterior end tend to be better than other positions in most parameters measured. Small sized pods can now be sold to cocoa farmers at cheaper price than the bigger sized pods that can now be used for dry bean production.

The study is being repeated in the current year for a confirmation and validation of the result.

Evaluation of Plantain as shade crop for permanent cocoa nursery (Famaye, A.O.; Iremiren, G.O.; Olaiya, A.O.; Ipinmoroti, R.R.; Sanusi, R.A. and Ayegboyin, K.O.).

INTRODUCTION

The nursery is the place where the cocoa beans germinated as soon as they are harvested and where the young plants are raised for at least five months with a view to planting them out in the field. It is a very important place upon which the success or failure of the future plantation will to a large extent depend. Farmers in Nigeria could not afford artificial nurseries shade for their cocoa because of their cost of this material and none readily available at farmers disposal.

The usual ways of providing the shade required for cocoa nursery by cocoa farmers in Nigeria is building annually a framework of wooden or bamboo pole 3m high which will support shading at a distance of some 2.5m from the ground, letting through approximately 50 percent of light intensity. Palm frond is usually used in creating this shade by putting it at upright and side ways of this wooden/bamboo. In several countries shading of the nursery is achieved using various permanent plants such as Hevea, the oil palm or Gliricidia (Coste 1992). Plantain have been found to provide 50 percent light intensity required for coffee at the early stage of field establishment (Famaye, 2000). Plantain is a fast growing crop with good shade which always serve as source of food and also being economic return to farmers when the bunches and suckers are sold. Cocoa farmers in Nigeria used plantain as nursery shade for the establishment of their cocoa on the field. Plantain is easy to establish and could be grown at farmers' backyard.

The objective of this study therefore is to evaluate plantain as shade crop for permanent cocoa nursery.

MATERIALS AND METHODS

The experiment was started in 2004 and located at the Central nursery, Cocoa Research Institute of Nigeria (CRIN) Headquarters, Ibadan. The land preparation was done in March, 2004 and all trash and felled trees were removed. The plantain suckers were obtained from CRIN Nursery. The plot layout, holing and planting of plantain suckers according to each treatment were carried out in May, 2004. The layout was a randomized complete block design replicated three times.

In November 2004 the polythene bags were filled with top soils. 100 polythene bags were arranged under plantain shade (treatments) planted viz: 1.0m, 1.5m, 2.0m, 2.5m and 3.1m apart and open space without plantain) used as control. Freshly harvested cocoa pods were collected from zone 8 at Institute experimental plot in Ibadan in May 2005. Sowing of the beans were done immediately with two beans per polythene pot and later thinned to one leaving the most vigorous ones.

Parameters considered for data collection were plant height, girth leaf number and leaf area of cocoa seedlings. Plant height, girth, leaf number and leaf area of plantain as well as bunch yield on treatment basis. The light intensities of each treatment were taken with light meter. Ruler and vernier calliper were used for plant height and girth of the cocoa seedlings respectively. The results were subjected to statistical analysis of variance and LSD was used to separate the means that were significant.

RESULTS AND DISCUSSION

Result of light intensity from the trial is shown in Table 1. Results obtained on plant height, stem girth and leaf areas of cocoa seedlings are shown in Tables 2, 3 and 4 respectively. Treatment with plantain at 3.0m apart was highest in plant height and closely followed by 2.5m apart. The two were significantly higher than the control and other treatments (P=0.05) from 3 months after sowing. The least was recorded from the

closer spacing of 1.5m apart. The highest plant girth was recorded from 3.0m apart followed by 2.5m apart. The same trend was also recorded for leaf area.

The higher values in plant height, girth and leaf area recorded for cocoa seedlings under plantain of 3.0m apart and 2.5 apart might have been due to shading from plantain that reduces temperature in cocoa nursery to the level that was mostly advantageous for its photosynthesis. This agreed with the findings of Opeke (1982), Are and Adenikinju (1967) who reported such beneficial effects from cocoa nursery when light intensity is 50 percent. In the 52 and 54 percent light intensities recorded for $3.0m^2$ and $2.5m^2$ respectively. Table 1 was also in consonant with Famaye (2000) that recorded, light intensity of 50 percent as best for coffee performance when plantain was used as shade crop at 3m apart.

Table 5 showed the mean growth parameter of the plantain. Treatment of 1.0m apart was the tallest, closely followed by 1.5m apart. The least was 3.0m apart. This shows that the taller plantain plants observed in $1.0m^2$ and $1.5m^2$ were struggling for and competes for light for photosynthesis. This indicate that logging may be pronounced in these treatments if there is severe wind blow than the other treatments as their stem girth were also thinner. Table 6 shows the economic yield obtained from the plantain. The number of bunches, fingers fresh weight and selling price indicated that it give additional economic returns to the farmer via the conventional method of using bamboo and palm fronds. The highest selling price was obtained from 3.0m apart which was also followed by 2.5m apart than other treatments. Considering the good growth parameters recorded for cocoa seedlings under 3.0m and 2.5m apart as well as the economic returns it is suggested that plantain planted at either 3.0m or 2.5m apart be recommended to the farmers in Nigeria as permanent nursery shade.

Table 1: percentage Light Intensity (%) and Field capacity (moisture)

Treatment	%Light capacity	% Field Capacity (moisture)
1.0m apart	68	65
1.5m "	62	62
2.0m "	59	58
2.5m "	54	55
3.0m "	52	52

Table 2: Mean plant height (cm) of cocoa seedlings under different spacings of plantain as nursery shade.

Treatment	Months after sowing			
	1	2	3	4
1.0m apart	21.0	23.0	24.7	25.9
1.5m "	18.0	19.0	20.1	22.7
2.0m "	22.0	25.0	27.4	32.1
2.5m"	27.0	28.4	33.1	37.9
3.0m "	23.0	30.0	31.9	38.3
Open(control)	17.0	19.9	21.2	28.7
Mean	21.3	24.9	26.4	30.9
LSD(P=0.05)	3.46	4.67	5.17	5.84

Table 3: Mean stem girth (cm) of cocoa seedlings under different spacings of plantain as nursery shade

Treatment	Months after sowing			
	1	2	3	4
1.0m apart	0.52	0.64	0.066	0.78
1.5m "	0.47	0.55	0.60	0.63
2.0m "	0.51	0.64	0.69	0.72
2.5m "	0.54	0.66	0.77	0.84
3.0m "	0.55	0.67	0.79	1.04
Open(control)	0.46	0.54	0.56	0.80
Mean	0.50	0.61	0.66	0.80
LSD(P=0.05)	0.04	0.06	0.10	0.14

Table 4: Mean leaf area (cm2) of cocoa seedlings under different spacings of plantain as nursery shade.

Treatment	Months after sowing			
	1	2	3	4
TR1	63.00	73.76	101.00	112.30
TR2	62.50	80.87	110.07	120.64
TR3	63.60	100.56	122.51	135.11
TR4	66.95	108.55	132.29	188.65
TR5	65.14	115.44	162.09	207.15
TR6	54.31	62.15	126.06	130.22
Mean	62.58	90.22	125.67	149.01
LSD(P=0.05)	4.18	20.21	20.25	37.48

Table 5: Mean of Agronomic Yield of the plantain as at

Treatment	Mean plant Height(cm)	Mean Plant Girth(cm)	Mean Number of Leaves
1.0m apart	455	64.50	11
1.5m "	440	69.25	10
2.0m "	416	69.75	10
2.5m "	410	74.25	10
3.0m "	375	75.75	10
Mean	419	70.7	10.2
LSD(P=0.05)	34	4.95	0.4

Table 6: The Economic yield of the plantains between 05 Aug 2005 – 21 Jan. 2006

Treatment	No of harvested bunches (Total No)	Total number of fingers	Total fresh weight of harvested bunches (kg)	Selling price of the harvested bunches (₦)
1.0m apart	12	290	77.9	3680
1.5m "	12	374	85.3	3830
2.0m "	13	450	97.0	4050
2.5m "	13	488	120.5	5200
3.0m "	17	400	103.6	4510
X	14	400	96.7	4254
LSD(P=0.05)	2.6	84	18.4	683

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Title of Programme: **COCOA PROGRAMME (Leader: Dr. S.O. Agbeniyi)**

Experimental Title: Evaluation of higher density planting in Cocoa plantation in Nigeria (Famaye, A.O., Olaiya, A.O. and Ayegboyin, K.O.)

Introduction: The optimum spacing between cocoa trees in the distance, which will give the greatest economic return of cocoa per unit area. In Nigeria, two spacing have been recommended viz: 2.5 x 2.5m and 3.1 x 3.1m given plant population of 1600 and 1040 plants per hectare respectively. As a result of several developmental activities that makes African land competitive, any agricultural practices that focus on effective resource use it's the panacea for farm sustainability. A result of high yield with close spacing has been reported from Colombia where cocoa planted at 2500 trees per hectare yielded 1705kg dry beans per hectare (Gutierrez, 1981). Also a yield of 5000kg was reported from Malaysia high-density planted trees.

Objectives: (i) To determine the highest density in which cocoa tree could give the greatest economic returns in the three cocoa ecologies in Nigeria.

(ii) To determine the best configuration of cocoa trees in the field which will give the effective and efficient use of resources.

Methodology: Four different spacings of 3.1 x 3.1m, 2.5 x 2.5m, 2.0 x 2.0m and 1.0 x 1.0m double row with 3m apart after each double rows were used to establish the experiment at CRIN headquarters Ibadan. It was laid out in a randomized complete block design with three replications. Data collection is on going. The establishment of the Owena trial commenced but stopped half way due to lack of fund while that of Ikom is yet to start.

Results: The results of survival rate, morphological parameters and weed incidents are provided on the table below.

Table 1: Weed species and their levels of occurrence at the experimental site.

Weed species	Family	Level of Occurrence	
		2003	2004
Broad Leaves			
Ageratum conyzoides L	Asteraceae	+++	+++
Acethospermum hispidium DC	Acanthaceae	++	++
Euphorbia heterophylla L	Euphorbiaceae	+++	+++
Euphorbia hirta L	Euphorbiaceae	+	+
Chromoleana odorata L	Compositae	+++	+++
Tridax procumbens L	Euphorbiaceae	+	+
Amaranthus viridis L	Amaranthaceae	++	+
Aspilia africana Pers CD Adams	Asteraceae	+	+
Portulaca oleraceae L		+	+
Grasses			
Cynodon dactylon (L) pers	Poaceae	+	+
Eleusine indica Gaertn	Poaceae	+	+
Panicum maximum Jacq.	Poaceae	-	+
Sedges			
Cyperus rotundus L	Cyperaceae	++	++
Cyperus esculentus L	Cyperaceae	++	++

+++ = High occurrence (60-90%)

++ = Moderate occurrence (40-59%)

+ = Minor occurrence (1-39%)

- = Non occurrence

Table 2: Growth response of cocoa to different spacings and plant population densities

Treatment	Plant Height(cm)	Plant Girth (cm)	Leaf Area (cm2)	Canopy scores
A(3.1m x 3.1m)	265.17	3.9	332.70	6.2
B(2.5m x 2.5m)	270.78	3.9	335.61	6.4
C(2.0m x 2.0m)	268.30	4.5	351.82	7.3
D (1.0m x 1.0m)	272.43	4.6	373.95	7.6
Mean	269.17	4.2	323.52	6.88
LSD (P=0.05)	4.35	0.60	46.99	0.94

ANNUAL REPORT 2005(OGUNLADE)

Title of Programme; COCOA PROGRAMME (Leader; S.0. Agbeniyi)

Experimental Title; Effects of Neem Fortified Cocoa Pod Husk Fertilizer on the Growth of Cocoa Seedlings. (Ogunlade M.O.)

Introduction

The use of organic materials as fertilizers has been found to contribute to the improvement of soil nutrient levels and ameliorating soil physical properties to sustain crop production. (Fuet al 1987, Obatolu and Agboola, 1991).
However, the nitrogen content of cocoa pod husk (CPH) is very low hence the need to use of neem leaf (NL) and neem seed (NS) powder as Nitrogen sources to the CPH based organic fertilizer.

Objectives

The study was conducted to:

(i) Formulate organic fertilizer from CPH, NL, and NS.
(ii) Evaluate the effects of the fertilizers on the physical and chemical properties of the soil.
(iii) Assess the supportive effects of the fertilizer on cocoa seedling growth
(iv) Determine the optimum fertilizer rate that enhances cocoa seedling growth.

Materials and Methods

The experiment was laid out in a completely randomized design. Six fertilizers- CPH, CPH+ NL (90:10) CPH+NL (80:20), CPH + NS (90:10). CPH +NS (80:20), NPK at five rates (0, 5, 10, 15 and 20kg N/ha) were evaluated in the greenhouse. Soil samples were collected, mixed air dried and sieved to pass through 2mm sieve. The representative soil samples and the organic materials were analyzed for their nutrient contents. 5kg soil was filled into each 5-litre bucket, watered to 70% field capacity and left overnight. Fresh cocoa beans were planted in each of the pots. Fertilizer application was done at planting. Data on plant height, numbering of leaves and stem diameter were taken monthly for six months and dry matter yield (DMY) determined at the end of the experiment. The data were subjected to analysis of variance (ANOVA) and means were separated using Duncan Multiple Range system.

Results and Discussion

Cocoa pod husk (CPH) fortified or not fortified with neem seed or neem leaf and NPK gave similar values of height, number of leaves and stem diameter of cocoa seedlings (Table 1). Fertilizer rates have significant effect on the growth and drymatter yield (DMY) of cocoa seedling. Both the organic fertilizer and NPK applied at 10kgN/h significantly enhanced the plant height, number of leaves, stem diameter and drymatter yield of cocoa seedlings better than the effects of 0 and 5kgN/ha. The effects of fertilizers applied at 15 and 20kgN/ha were not significantly better than 10kgN/ha for all the growth parameters considered. (Table 2). The results on the effect of the fertilizers on soil properties and plant nutrient uptake are being processed.

Table 1: Effects of fertilizer types on the plant height, stem diameter and number of Leaves of cocoa seedling at 6MAP

Fertilizers	Plant Height	Stem Diameter	Number of leaves
CPH	46.47a	0.935	18.60ab
CPH+NL (90:10)	44.69ab	0.967	18.87ab
CPH+NL (80:20)	41.30b	0.930	18.87ab
CPH+NS (90:10)	44.73ab	0.967	19.80ab
CPH+NS (80:20)	41.65b	0.913	20.87a
NPK	44.15ab	0.930	18.13b
		NS	

Table 2: Effects of fertilizer rates on the plant height, stem diameter, number of leaves and dry matter yield (DMY) of cocoa seedlings at 6 MAP.

Fertilizer Rates	Plant height	Stem Diameter	Number of leaves	Drymater yield
0kgN/ha	38.64c	0.633c	17.33c	9.50c
5kgN/ha	41.84bc	0.889b	17.89bc	15.98b
10kgN/ha	48.18a	1.125a	20.17a	20.64a
15kgN/ha	45.58ab	1.093a	18.78b	18.42ab
20kgN/ha	44.92ab	0.972ab	18.61b	16.41ab

Summary and Conclusion

Neem fortified cocoa pod husk and non-fortified cocoa pod husk enhanced cocoa seedling growth. The fertilizer rate of 10kgNha significantly improved cocoa seedling growth hence this rate (10kgNha) is recommended.

Title: Effects of organic and inorganic fertilizer types on growth performance of cocoa seedlings in Ibadan (Ipinmoroti, R.R., Iloyanomon, C.I. and M.O. Ogunlade)

Objective:

To assess the use of organic nutrient sources compared with inorganic sources to cocoa seedlings for appropriate advice to cocoa farmers on how to revitalize moribund cocoa soils for successive establishment of young cocoa seedlings.

Material and methods:

Top soil at 0 – 30 cm was collected from a moribund cocoa farm, processed and analyzed for N by micro Kjedhal method, available P by Bray 1 method, Ca and Mg by 1M NH_4OAC leachate and read from Atomic Absorption Spectrophotometer (AAS) and K by flame photometer. The soil was weighed at 10 kg pot-1. Two seeds of F3 amazon variety cocoa were planted in each pot at 5 cm depth. Pulverized organic fertilizer materials (cocoa husk, poultry droppings and cattle dung) were analyzed for nutrient compositions, while rock phosphate (RP), single super phosphate (SSP), muriate of potash (MOP) and NPK (15:15:15) were used based on company grade.

The manures (cocoa husk, poultry droppings and cattle dung) and inorganic fertilizers (NPK – 15:15:15, USM – urea + SSP + MOP and URM – urea + RP + MOP) were applied to supply 10 kg N ha-1. Mineral P and K sources were at equivalent rate of N, while organic P and K depended on their concentrations in the manures and the % N concentration. The fertilizers and control were each applied to 18 pots, arranged in 3 replicates of 6 pots per treatment in completely randomized design (CRD) in the green house. The pots were watered twice weekly to field capacity and growth parameters taken monthly on plant height, girth, number of leaves and leaf area for 9 months.

Two pots per replicate per treatment were sampled at 3, 6 and 9 months after planting (MAP). Plants were uprooted for no root destruction, washed, dried to constant weight, weighed and dry matter yield (DMY) obtained for the leaf, stem and root. Root length was obtained before drying. Mean values of data were subjected to analysis of variance and treatment differences separated by least significant difference ($P<0.05$)

Results

The soil N (0.71 g/kg), P (4.6 mg/kg), Ca and Mg (1.65 and 0.27 cmol/kg) and organic carbon (4.2 g/kg) contents are low compared to critical values of 0.92 g/kg N, 10 mg.kg P, 5.0 and 0.8 cmol/kg Ca amd Mg calculated for cocoa (Egbe, et al., 1989)and 19.0 – 32.0 g/kg organic C (Egbe and Omotosho, 1972). The soil K (0.63 cmol/kg) was optimum when compared with the critical value of 0.3 cmol/kg. the low soil contents for the major nutrients and soil organic C signifies the need to improve the soil nutrient and organic C contents for optimal cocoa performance. The manures (Table 1) contained appreciable amount of N (1.14 – 2.72 %), P (0.15 – 1.55 %), K 0.83 – 3.96 %), Ca (0.77 – 3.35 %) and Mg (0.33 – 0.54 %) and could supply the nutrient needs of cocoa plants if applied appropriately. The nutrient values of the inorganic materials were according to company grade, while rock phosphate was according to Obigbesan and Akinrinde (2000).

Table 1: Some nutrient compositions of the fertilizer materials used

Nutrient (%)	Cocoa husk	Poultry droppings	Cattle dung	Rock phosphate	Muriate of potash	NPK 15:15:15	Single Super phosphate	Urea (46 %)
N	1.46	2.92	1.29	-	-	15	-	46
P	0.15	1.55	0.60	15.75	-	15	18	-
K	3.96	1.83	0.83	0.04	60	15	-	-
Ca	0.77	3.55	1.57	25.7	-	-	-	-
Mg	0.33	0.54	0.47	0.57	-	-	-	-

Results on growth parameters (Table 2) showed that mineral fertilizer performed better than the manures at 3 MAP, with significant mean differences ($P<0.05$) in leaf area and TDMY. At 6 MAP, the manures performed better than mineral fertilizers on growth parameters and TDMY. The trend was maintained at 9 MAP with significant mean differences ($P<0.05$) in number of leaves, Leaf area, TDMY and root length. The TDMY due to the manures were 29.3 – 55.9 % higher than the control, while it was 4.32 – 13.9 % in the inorganic fertilizers. The NPK of rock phosphate mixture enhanced better TDMY, root length and root weight than other types. The low response of cocoa seedlings to

manures and URM at 3 MAP may be due to their initial slow nutrient release, which was overcome afterward. It can be concluded that manures were better nutrient sources than NPK fertilizers for cocoa seedlings, while NPK formulated from urea + rock phosphate + muriate of potash mixture was better than other NPK mixtures.

Table 2: Growth parameters and dry matter yield (DMY) of cocoa seedlings at 3, 6 and 9 months after planting (MAP)

Treatment	Height (cm)	Girth (cm)	Number of leaf	Leaf area (cm^2)	Root length (cm)	Root weight (g)	DMY (g)
3 MAP							
CH	41.6	0.79	16.6	1190	46.7	2.17	11.6
PD	44.6	0.78	17.2	1225	29.2	2.15	12.3
CD	43.6	075	15.4	1234	29.7	1.82	11.7
USM	45.2	0.78	17.3	1568	37.0	1.62	10.5
URM	41.2	0.77	16.4	1256	31.4	1.85	12.3
NPK	43.0	0.75	17.1	1593	39.8	2.37	15.9
CTR	38.8	0.78	16.9	1525	44.5	2.83	15.2
LSD (5%)	NS	NS	NS	265.5	NS	NS	3.45
CV (%)	8.38	6.82	9.31	19.1	20.3	42.0	25.1
6 MAP							
CH	67.0	1.02	27.8	3955	78.7	6.5	33.3
PD	72.7	1.02	27.8	3505	65.0	6.5	29.7
CD	63.8	0.96	24.3	3039	65.0	6.1	27.8
USM	65.8	1.00	26.7	3194	46.0	4.42	22.9
URM	62.3	1.13	22.2	2985	72.3	5.9	30.4
NPK	62.4	0.97	23.2	2972	67.7	5.2	21.9
CTR	61.4	0.98	24.3	2801	70.0	4.2	23.0
LSD (5%)	NS	NS	6.89	348.5	NS	NS	7.57
CV (%)	8.92	11.0	8.65	17.2	30.1	54.5	40.2
9 MAP							
CH	79.8	1.53	34.0	4574	94.0	11.4	59.8
PD	100.2	1.52	41.2	4115	136.0	13.7	65.0
CD	86.0	1.58	30.7	3985	106.3	11.5	53.9
USM	79.5	1.57	28.9	3970	61.7	10.6	46.2
URM	74.0	1.50	29.7	3654	104.3	10.6	47.5
NPK	78.1	1.52	30.7	3128	81.3	9.58	43.5
CTR	72.9	1.58	30.0	2869	84.0	8.7	41.7
LSD (5%)	NS	NS	2.10	526.4	38.3	NS	9.34
CV (%)	13.0	16.3	14.6	21.6	58.3	87.2	35.6

CH = Cocoa husk, PD = Poultry droppings, CD = Cattle dung, USM, = Urea + SSP + MOP, URP = Urea + Rock phosphate + MOP, CTR = Control, LSD = Least significant difference, CV Coefficient of variation, NS = Not significant

ANNUAL REPORT 2005

Title of Programme : ***KOLA PROGRAMME***

Title: Evolving Cheap and Economic method of kola Propagation (L.A. Hammed, Olaiya, A.O. and Adedeji, A.R.)

Introduction: Kola is mainly propagated by seeds which are either sown at stake or raised in the nursery prior to transplanting (Bodard, 1962), The most economic part of the plant (kola nuts) equally serves as the propagules. Therefore, an increase in the hectarage of kola would have a directly corresponding reduction effects on the supply of the nuts to the markets.

This experiment was thus set up to study the germination behaviors of various embryo portions of kola nuts in the nursery. This is to reduce the number of kola nuts used in kola propagation.

Materials and Method

It is a factorial experiment laid out In CRD with three replications. Nut colour (C) (white pink and red) and embryo portions (P) (whole nut, split nut, half (latitudinally cut) nut and excised embryo (embryo plus few portions of the cotyledon) constitute the two factors with twelve treatments. The treatments were prepared as shown in plate Sowing was done in the top soil contained in 5kg plastic pots (216 pots were involved).
Prior to sowing these kola treatments were treated with 4g of champ-D-P in order to prevent any fungal infection and regularly watered. Germination counts were done monthly and % germination calculated 3 months after planting (MAP)

Results

The results (Figure 1) showed that the control embryo portions (Whole Nuts) recorded the maximum germination percentage of between 38.90% and 66.70% in all the three colours. These are significantly different from other treatments. The split nut recorded % germination ranging from 16.7% to 33.4%. The latitudinally halved kola nuts performed poorly with % germination ranging from 0.0% to 11.10% while the excised embryo had germination percentage of between 16.70% and 33.30%.
The results of the excised embryo conventionally germinated are encouraging and call for further trials.

The general poor performance recorded was observed to be as a result of a number of factors. These include-

1. Deep sowing depth.
2. The longitudinally split nuts corresponded to splitting the embryo. Therefore, radicle development occurred but plumule could not at 3MAP.
3. The thickness (bulk density) of the top soil exerted mechanical restrictions on emergence of some treatments. Thus growth medium/media of lighter bulk density such as saw dust, river sand or their mixture are expected to be used in future trials
4. Sowing orientation is another factor.

Conclusion

Germination of kola through embryo portions and development into viable kola seedlings by conventional method are possibilities. However further trials are necessary with observed germination constraints taken into consideration before recommendations are made.

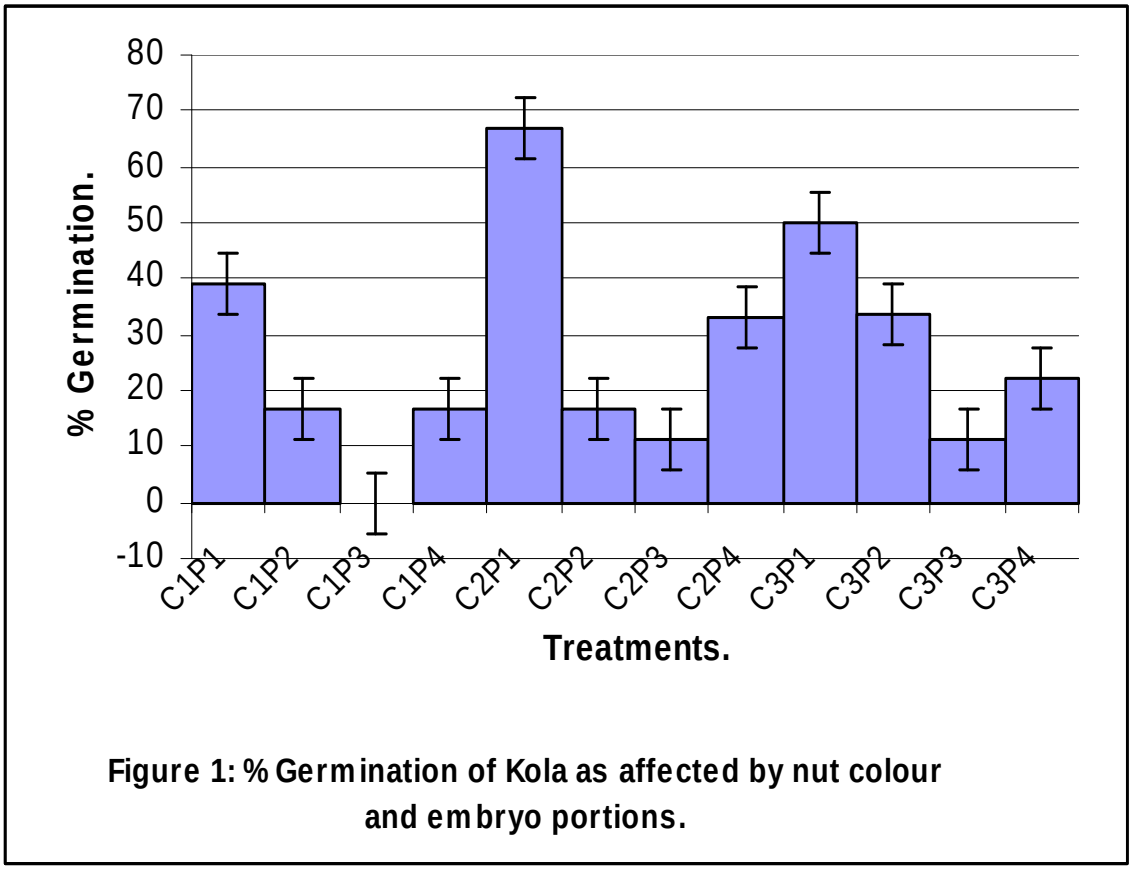

Figure 1: % Germination of Kola as affected by nut colour and embryo portions.

Legend

C1= White nut

C2= Pink nut

C3= Red nut

P1= Whole nut

P2= Split nut

P3= Half nut (whole nut cut into half)

P4= Excised embryo.

Experimental Title: Response of Kola Seedling to Depleted Soils Amended with Organic Fertilizers (Ogunlade M. O., Adebowale L. A and Ipinmoroti R. R.)

Introduction

Presently, obtaining forest top soil for raising Kola seedlings have become very difficult and forest top soils have had to be purchased at exorbitant rates. This has been the problems of many organizations involved in raising tree crop seedlings for commercials purposes

Objectives

This study was carried out tom ameliorate the depleted soils (sub-soils) by amending it with poultry droppings (PD), kola pod husks (KPH) and cocoa pod husks (CPH) for raising kola seedlings.

Materials and Methods

The experiment was laid out in Complete Randomized Design (CRD) with three replications. There were five treatments:

I Top soil alone
II Subsoil + KPH
III Subsoil + KPH
IV Subsoil + PD
V Subsoil alone which served as the control.

Soil samples were collected and processed. 5kg soil was filled into each 5 litres bucket, watered to 70% field capacity and left overnight pre-germinated kola nuts were then transplanted into the pots. The organic fertilizer materials were added to supply 10kgN/ha. Growth parameters (plant height, number of leaves, stem diameter and leaf area) were taken monthly. Data were subjected to analysis of variance (ANOVA) Means were separated using LSD.

Results and Discussion

Subsoil amended with KPH and CPH gave comparable plant height, stem diameter and number of leaves with the unamended top soil both at 2 and 4 months after planting(Table 1)
Kola seedlings planted amended subsoils and unamended topsoils performed significantly better than the control (unamended subsoil) Subsoil amended with poultry droppings significantly enhanced kola plant height at 2MAP and 4MAP than other treatments. The superior performance of kola seedlings in poultry amended subsoil could be attributed to its higher nutrient content due especially to nitrogen.

Table1: Effects of Depleted soils Amended with Organic Fertilizers on the Growth of kola seedling.

	Months After planting (MAP)					
Treatment	Plant Height	Stem Diameter	Number of leaves	Plant height	Stem Diameter.	Number of leaves
Subsoil+KPH	18.70	0.50	4.33	32.72	0.64	8.3
Subsoil+CPH	21.70	0.44	4.53	34.07	0.64	10.0
Subsoil+PD	24.83	0.48	4.67	39.51	0.69	9.5
Topsoil alone	21.40	0.46	4.67	32.73	0.65	7.3
Subsoil alone	17.73	0.40	4.33	27.83	0.46	6.7
LSD	2.12	0.15	0.91	4.91	0.17	2.71

Summary and Conclusion

In places where there is dearth of forest top soils, organic fertilizers such as poultry droppings, cocoa pod husks and kola pod husks can be applied to improve the productivity of the depleted soils used in raising seedlings.

COFFEE PROGRAMME 2005 ANNUAL REPORTS
Programme Leader- (Dr Ibiremo, O.S)

Experimental Title: Clonal Propagation of ***Coffea canephora*** (S. S. Omolaja, K. E. Dada, E. A. Adeyemi)

Objective: To perfect a dynamic clonal propagation technique for large-scale production of *Coffea canephora*.

Materials and Methods:

100 rootstocks were raised from *Coffea canephora* from which 50 rootstocks were selected for the grafting experiment at 8 months after planting. Orthotropic shoot of the selected clones were collected as scions and Top – cleft method of grafting was employed. At 2 weeks after grafting, number of "takes" were recorded. Subsequent records of die-back were recorded at 4 weeks after grafting (4 WAG), 6 WAG and 8 WAG. The result of the trial is presented in table 1 below:

Table 1: Percentage success in coffea grafting trial

Clones	**No Grafted**	**Graft-take**	**Die-back 4 WAG**	**Die-back 6 WAG**	**Die-back 8 WAG**
C36	10	9	2 (22.2%)	0 (0%)	0 (0%)
C90	10	5	0 (0%	0 (0%)	0 (0%)
C111	10	8	1 (12.5%)	0 (0%)	0 (0%)
M10	10	4	0 (0%)	1 (33.3%)	0 (0%)
T1049	10	6	2 (33.3%)	0 (0%)	0 (0%)

The above result showed that graft-take success ranged from (40% to 90%), while dieback percentage ranges from 0% to 33.3% in the 5 clones studied. The result also showed that the variation in percentage success of coffee grafting can be attributed to genotypic differences. From the 2 years (2004, 2005) preliminary studies, C111 & C36 gave consistent high and percentage success, suggesting that the materials are most suitable for grafting than others. Although M10 gave a very promising result in the year 2004 trial, but performed poorly in year 2005 trial. This will be further investigated. Factors, like time of grafting will be considered in the next phase of the study.

Experimental Title: Coffea seed garden establishment (K. E. Dada, E. A. Adeyemi and S. S. Omolaja)

Objective:

To establish an improved seed garden at the CRIN Headquarters.

Materials and Methods:

One hectare is to be established at CRIN Headquarters. The establishment commenced 2003/2004. The selected clones to be established are C36, C111, C90, T1049 and M10. The cuttings were raised in the nursery, while ball to earth method of transplanting was employed. Augmented design was adopted for the establishment. Survival counts were recorded for the year under review. All the nine blocks established have been supplied with plantain suckers. Three blocks have been planted with selected coffea clone.

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Result:

The results show that most clones supplied in the year under review die back due to drought. M10 and C90 were supplied on 24th of August, 2005, 50 cuttings of C90 and, 100 cuttings of M10 were supplied to the garden, the success takes percentage show that 1% and 0% were recorded at Block I and Block II respectively. While 8% and 0% were recorded at Block I and Block II respectively for M10. The selected material to be planted in the remaining block are undergoing hardening process in the nursery.

Table 1: Survival counting in Block 1

Clones	R1	R2	R3	R4	R5
C36	1	2	2	2	1
C111	3	4	3	4	1
C90	0	0	0	1	0
T1049	1	0	2	3	1
M10	0	0	0	2	0

Table 2: Survival counting in Block II

Clones	R1	R2	R3	R4	R5
C36	5	5	4	5	3
C111	4	2	3	5	3
C90	0	2	0	0	0
T1049	2	0	2	3	4
M10	0	0	0	0	0

Table 3: Survival counting in Block III

Clones	R1	R2	R3	R4	R5
C36	0	2	0	0	0
C111	1	0	0	0	0
C90	0	0	0	0	0
T1049	0	0	0	0	0
M10	0	0	0	0	0

Experimental Title: Clonal Propagation of coffea arabica (Omolaja S. S., Ibiremo O. S., Famaye, A . O. and Oloyede A. A.)
Objective: To perfect effective clonal propagation of *Coffea arabica*

Materials and Methods:
1,680 cuttings of Arabica coffea were set at CRIN, substation in Mambilla. 84 varieties were collated for the experiment. 20 each of the selected varieties were set

3
using half node cutting as a propagation technique 8000 PPM of IBA was used to enhance rooting. The cuttings, were opened 8 WAS further dataq were collected at 16 WAS and 24 WAS.
Result: The result above shows that success takes at 8 WAS were low the range of success take is (0-20%); at 16 WAS, the success take were improved (0-60%); and at 24 WAS (0-70%). The outcome of the experiment to show that success takes in *Coffea arabica* take place over a period of time.

Table 1: Success Take

Variety	NO SET	8 WAG	16 WAG	24 WAG
5	20	4	7	6
6	20	1	0	0
7	20	4	2	2
8	20	0	1	0
9	20	0	3	2
10	20	4	11	9
11	20	0	8	7
13	20	0	0	3
14	20	2	5	3
20	20	0	7	7

21	20	0	4	4
22	20	0	9	9
27	20	0	2	2
30	20	0	4	3
31	20	2	5	5
32	20	0	7	4
33	20	3	11	11
34	20	0	8	7
35	20	0	7	7
36	20	0	8	9
38	20	2	10	14
39	20	2	5	6
40	20	1	10	9
43	20	0	6	5
44	20	0	10	9
45	20	0	3	2
46	20	0	4	2
47	20	3	2	2
48	20	0	0	2
49	20	0	12	0
51	20	3	3	11
53	20	0	8	3
54	20	1	3	8
55	20	3	10	3
56	20	0	7	8
60	20	0	8	7
61	20	0	0	8
62	20	0	8	7
63	20	2	3	4
64	20	1	8	10

Variety	**NO SET**	**8 WAG**	**16 WAG**	**24 WAG**
65	20	0	12	12
66	20	3	10	1112
67	20	0	12	4
69	20	0	6	6
70	20	1	6	5
71	20	0	7	6
72	20	3	9	5
73	20	0	4	6
74	20	2	5	3
75	20	1	2	5
76	20	0	4	5
77	20	0	8	4
78	20	0	3	7
79	20	1	7	4
80	20	0	6	8
81	20	0	8	12
82	20	0	11	8
83	20	0	7	8
84	20	0	10	4
87	20	0	5	7
88	20	0	5	6
89	20	0	7	7
90	20	0	6	6
91	20	0	6	5
92	20	2	1	0
93	20	0	0	0
95	20	0	0	0
97	20	0	4	4
98	20	0	3	3
99	20	0	0	0
100	20	0	8	10
101	20	0	1	2
102	20	0	0	0

103	20	0	6	6
104	20	1	6	5
105	20	0	7	7
106	20	4	7	7
107	20	3	3	3
108	20	0	8	10
109	20	0	4	3
110	20	1	4	4
111	20	1	7	8
112	20	0	2	8
113	20	0	7	8

Experimental Title: Evaluation of yield of coffee established at different geometry and combination of clones (Famaye, A. O.; Oloyede A. A. and Ayegboyin, K.)

Introduction: *Coffea canephora* Pierre ex Froehner is known to be self-incompatible (self sterile). In view of this, agronomists and breeders are confronted with how to increase the yield of this crop. Rene (1991) has reported combination of different clones of *C. canephora* to improve yield. This fact was corroborated by Pochet (1989).

Objective:

To increase yield per unit area of coffee by employing different field configuration and mixture of clones.

Materials and Methods:

Various geometries and combinations of *C. canephora* clones were exploited viz:

(i) All seedlings (Control)
(ii) Triangular arrangement of seedlings and cuttings
(iii) All cuttings plot
(iv) Alternate rows of cuttings and seedlings
(v) Alternate stand arrangement of cutting and seedling stands
(vi) Half cuttings and seedling arrangement

Each of the treatments contained 30 stands of coffee seedlings, cuttings or the combination of both, as the case may be.

S S S S S	C C C C S	C C C C C	C C C C C	C S C S C	C C C C C
S S S S S S	C C C C S	C C C C C	S S S S S	S C S C S	C C C C C
S S S S S S	C C C S S	C C C C C	C C C C C	C S C S C	C C C C C
S S S S S S	C C S S S	C C C C C	S S S S S	S C S C S	S S S S S
S S S S S S	C S S S S	C C C C C	C C C C C	C S C S C	S S S S S
S S S S S S	C S S S S	C C C C C	S S S S S	S C S C S	S S S S S
(i)	(ii)	(iii)	(iv)	(v)	(vi)

Legend: C = Cuttings, S = Seedlings

The experimental layout used was Randomized Complete Block Design (RCBD) replicated three times. Data on berry yield were collected and subjected to statistics analysis of variance – LSD was used to separate the means.

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Results

Table 1: Mean Berry yield by per hectare of different combination of coffee

Treatment	**Wet weight fresh (kg)**	**Dry weight (kg)**
I	0.84 (873.6)	0.71 (738.4)
Ii	1.03 (1071.2)	0.78 (811.2)
Iii	1.43 (1487.2)	(1.26 (1310.4)
Iv	1.36 (1414.4)	1.24 (1289.6)
V	0.78 (811.2)	0.62 (644.8)
Vi	0.51 (530.4)	0.40 (416.0)
LSD	0.45	0.32

Values in parenthesis are in kg/ha

Analysis of variance revealed that significant differences exist between the treatments. The results obtained had shown the order of performance (highest to lowest) to be 1487.2
(iv) > 1414.4 (iv) 1071.2 (ii) > 873.6 (I) > 811.2 (v) > 530 (iv) kg/ha fresh weight value.

The dry weight followed the same trend. The results obtained in this study had further buttressed the need to have as many clones together on the same piece of land to enhance cross fertilization and yield. Intermixture of cuttings and seedlings also increase yield given the kind of geometry used. All seedling geometry as in (I) and half seedlings, half-cutting as in (vi) is therefore not encouraged.

Experimental Title: Damage assessment studies of larvae of ***Epicampaptera strandi*** on ***Coffea canephora*** (Anikwe J. C. and F. A. Okelana)

Introduction:

Coffee yield is not yet at its optimal level because of insect pests infestation, notably among which are the Coffee Berry Borer (CBB), *Hypothenenmus hamper* Ferrari (Coleoptera: Scolytidae) and three foliar pests viz: *Epicampoptera* Species (Lepidoptera: Drepanidae), *Caphonodes hylas* L. (Lepidoptera: Sphingidae) and *Leucoplema dohertyi* Warren (Lepidoptera: Epiplemidae) (Okelana, 1989). However, among the foliar pests, *E. strandi* is the most destructive, occurring almost exclusively during the early rains (March – August) with a peak in July and causing enormous defoliation and consequent decrease in yield of coffee. The short development period, coupled with high fecundity and pattern of egg-laying makes *E. strandi* an important economic insect pest of robusta coffee in Nigeria (Okelana, 1985).

Objective: To assess the percentage leaf area consumed by the larval stage of *E. strandi*

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Materials and Methods:

Field-collected eggs of *E. strandi* were incubated in the laboratory until eclosion occurred under ambient conditions of temperature of 27 ± 2^{o}C and 70-88% relative humidity. Ten day-old larvae of *E. strandi* were introduced separately onto freshly plucked leaves of robusta coffee, which were changed daily in the laboratory. Leaf Area Damage was assessed via the use of a Leaf Area Meter (Model CI – 202). Plucked coffee leaves were scanned with the Area Meter before being fed to the insects and 24 hours after being fed to the insects. The area of leaf defoliated was estimated as the difference between the areas of leaves before and after feeding. The equivalent damaged area of leaf was finally expressed as a percentage of the mean area of whole leaf.

Percentage area of damaged Leaf = mean damaged leaf area 100mean whole leaf area 1

Results and Discussion:

The result of the experiment is as follows:

Table 1: Mean percentage leaf area consumed by each larva instar of *Epicampoptera Strandi*

Larva stage	Sample Size (n)	Leaf area consumed (cm^2)	Range of leaf area consumed (cm^2)	Leaf area consumed (%)
1st instar	10	3.78	0.74-8.32	1.41
2nd instar	10	12.10	8.61-16.70	4.35
3rd instar	10	18.67	17.22-26-.45	25.60
4th instar	10	24.74	26.10-30.84	63.20
5th instar	10	32.50	31.67-34.55	88.40

The damaged effected on coffee leaf at the first instar stage was very minimal as the larvae were found to scrape the lower epidermal layer of coffee leaves and only 1.41% of leaf was consumed. The fifth instar larva was the most destructive with 88.4% of leaf area consumed in a day. This is in agreement with the observations made by Okelana (1989) that the last instar larva is the most destructive and capable of eating not just the leaf lamina but also the entire coffee leaf especially during severe infestation leading to the yield of the shrub being affected for several years.

The next stage of the work will involve further monitoring of the pests, laboratory culturing of insect pests on the various varieties of robusta coffee and perhaps studies on resistance mechanism.

References

Okelana, F. A. (1985): Oviposition pattern, hatching and parasitism of eggs of *Epicmapoptera strandi* Bryk. Sub. Sp.. *Galuca* Hmps (Lepidoptera: Drepanidae) on coffee in Nigeria. Café. Cacao The. Number 4. Pp. 273-276.

Okelana, F. A. (1989). Bio-ecology and control of insect pests of coffee. In: Progress in Tree Crop Research, 2nd edition, CRIN, Ibadan, Nigeria. Pp. 152-165. **8**

Title:Extension visits to Ikereku model Coffee farm (Agbongiarhuoyi A.E)

Introduction:

Coffee robusta is an important socio-economic crop which thrives in low land area of Nigeris especially in Kabba, Kogi state and Ikereku in Akinyele local government area of Oyo State (Federal Ministry of Commerce Nation-wide coffee survey, 1999). In June 2003, a model coffee farm was established by coffee programme in Ikereku village to serve as an on-farm Adaptive Research (OFAR) for farmers. To consolidate this effort, some extension visits were made to the farm site in order to monitor the performance of the high yielding coffee genotypes.

State of the farm*:* Most of the coffee plants and plantain are doing well irrespective of weather vagaries such as inadequate rainfall and prolong dry season (Table 1).

Table 1: Performance level of Ikereku Model coffee farm

Survival counts	**Observation/Remark**
So far, 182 coffee survived out of 234 stands amounting to 77.8 per cent.	Some have started fruiting and a trial harvest was made by the beneficiary which was healthy
Missing stands (50 –70)	Needs gapping up
Stunted growth of come coffee due to poor drainage	The affected area requires proper central drainage system
Majority of the shade crop plantain survived	They are already producing bunches and earning revenue for the farmer with an average of 12 bunches every market day (9 days interval)
Other tree crops on the farm	Typical of a peasant farmer, there were presence of come oil palm and Irvingea trees planted on the farm by the farmer

Source: *Field survey, 2003 2005*

Maintenance*:* There is evidence of routine weeding and other cultural practices on the farm.

Training*:* Feedback from the coffee farm occasioned a preliminary training of the coffee contact farmer on identification and control of major and minor pest by CRIN entomologist.

Marketing*:* The coffee farmer (Baale) expressed concern on the potentials of selling the ripe beans after processing. He was assured of available marketing opportunities when production resumes fully. He however promised to expand his farm by 9 acres (3.06ha) if ready market is guaranteed for him.

Processing*:* For now, the contact farmer has not been trained on the proper way of processing raw coffee berries. Effort should be geared towards training farmers on primary methods of processing so as to ensure good quality.

Extension contact*:* Follow up visits to Ikereku coffee plot in 2003-2004 was low due to inadequate logistics. There were improvements in 2005 and this hitherto motivated the farmer to taking care of the plot. Previous reports of the farm by extension and coffee team had always been forwarded to the Executive Director. The Ikereku coffee farm is now serving as an Adopted village to our noble Institute

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Conclusions and Recommendations:

The Ikereku Model coffee farm is doing well, having 77.8% survival counts after establishment. Part of the farm needs gapping up and proper drainage to avoid water logging and stunted growth. To sustain and improve on the progress already recorded, more logistic support is required for extension regular visit to the coffee plot. The problems of coffee marketing should be adequately addressed by CRIN in order to encourage farmers to be more involved in coffee production.

Experimental Title: Mycoflora associated with Post-harvest wet-processing methods of coffea robusta and their effects on quality (Adedeji, A. R.; Ogunwolu, S. O and Oloyede, A. A.)

Introduction:

The current focus in export market of cash crops in the world is the prevention of mould proliferation and mycotoxin contamination of this important source of foreign earnings. Coffee have been reported by many workers as being contaminated by mycotoxins produced

by arrays of fungi. This has resulted in reduction of its value and acceptance. However scanty information is available on the presence of arrays of these mycotoxigenic fungi on Nigeria coffee especially the one produced through wet-processing method.

Objectives:

(i) to isolate and identify the mycoflora associated with different stages of this method and different mycotoxin associated with them.
(ii) to determine the critical control point in order to modify it for further prevention.
(ii) to determine the effects of these fungi and their mycotoxins on the nutritional quality of these substances.

Materials and Methods:

Samples from different stages of post-harvest wet processing were randomly collected, and examined using a modified method of Oyeniran (1977). A sample of ten beans was macerated in a blender bottle with 90ml of sterile watery (0.2%) agar using a high-speed homogeniser. Series of dilution were then prepared and 1 ml each was used to inoculate cooled (45^{o}C) molten culture media inside 9cm petri dishes and incubated for 3 days and then colonies of fungi recorded and identified.

Results: Eight different fungal species were isolated in all. Three of these are mycotoxin producing fungi viz: *Aspergillus niger*, *A. ochraceus* and *Fusarium Sp*. *A. niger* and *Fusarium Sp*. were frequently isolated from all the processing methods while A ochraceus was only isolated from coffee samples from unfermented unwashed method.

Aspergillus niger was the most frequently isolated from all the processing methods followed by *Fusarium Sp*. Interestingly, these two fungi are among mycotoxin producing fungi that have been implicated severally. The organisms are also associated

with all the processing methods (Table 1). Though *Aspergillus ochraceus* was found associated with one of the methods, however it was among the leats frequently isolated (Table 1). There was no significant difference (P ≤ 0.05) in all the methods screened, however going by the frequency of occurrence all the mould isolated, unfermented unwashed method could be recommended

Table 1: Frequency of occurrence of mycoflora in different primary processing methods of coffee beans

	Frequency of Occurence					
Fungal isolate	**Unfermented unwahsed**	**Unfermented washed**	**Basket fermented**	**Under water unwashed**	**Underwater washed**	**Mean**
Aspergillus niger	0.67	0.58	0.89	0.67	0.82	0.73a
A. Fumigatus	0	0	0	0.14	0	0.03.c
A. Ochraceus	0.08	0	0	0	0	0.02c
Fusarium Sp.	0.11	0.02	0.08	0.14	0.17	0.11b
Mucor Sp.	0.04	0	0	0	0	0.01c
Phytophthora Infestaus	0.06	0	0	0	0	0.01c
Trichoderma Sp.	0	0.28	0	0	0	0.06c
Lasiodiplodia theobromae	0	0.15	0	0.06	0	0.04c

Means followed by the same alphabet are not significantly different at P ≤ 0.05 by Duncan's Multiple Range Test (DMRT)

ANNUAL REPORT FOR THE YEAR 2005

CASHEW PROGRAMME (Leader:Dr. O. M. Aliyu)

Experimental Title: Re-establishment of Brazilian cashew germplasm plot at the CRIN headquarters (Aliyu, O. M., Hammed L A., Adeyemi E.A., Ibiremo O. S., Anikwe J. C., Otuonye H. A., Asogwa E. U., Orisajo S. B. and Ogunlade M. O.)

Introduction: The importance of germplasm to crop improvement cannot be overemphasized; it is the source of renewed genetic resource and selection of improved quality planting materials. However, this important component of crop genetic improvement has not been adequately put in place for cashew in the Institute despite over 30 years of research into the crop species. In 1999/2000, effort was made to establish 4.5 hectares of exotic Brazilian cashew accessions collected from Kosoni-Ola Farm Limited, Oro, Kwara State, unfortunately it was abandoned and all the genetic resource established therein were lost. This new effort was carried out to re-establish the plot with the collections of both Brazilian and Indian origins for future selection and improvement work in cashew.

Objective: To re-establish 2.5ha of cashew germplasm plot planted to Brazilian and Indian accessions for future selection and improvement works in cashew in the Institute.

Materials and Methods: Open pollinated nuts of adapted Indian Introductions earlier collected from WNDC plantation Iwo were collected from CRIN cashew plots at headquarters and Ochaja Substation, while the Brazilian accessions were selected from Kosoni-Ola Farm Limited, Oro, Kwara State. Only 2.5 hectares of the proposed 4.5 hectares of land along Onipe Gate was used for the new planting. The plot was laid out to accommodate the selections that were classified into 8 cashew genetic groups on the basis of origin and nut size (Table 1). Nuts of these accessions were raised into seedlings at nursery and transplanted to the field at 10 weeks old. The planting was done at spacing of 6.0m x 6.0m and each genetic group was planted into a block of 4 rows with 10 cashew stands per row i.e. 40 plants/block. The field was laid out with each block separated from the other by 3 rows of oilpalm at 9.0m x 9.0m spacing. Meanwhile the entire plot is to be surrounded by 3 rows of pineapple to be planted at 1.0m x 10.m spacing. Cassava was however selected as intercrop for the plot to be planted at 1.0m x 1.0m spacing to reduce weed incidence and generate income from the research plot. Unfortunately, only cashew was planted during the year under

review while planting of the intercrops (cassava, oilpalm and pineapple) cannot be carried out because of non-release of funds. Data were however collected on the cashew accessions at seedling stage and after transplanting. The data were summarized into Tables 2, 3 and 4 for percentage germination, survival percentage at 2 and 7 months after transplanting respectively.

Results and Discussion.

Table 2 shows the germination percentage of the cashew accessions. Indian Introductions Medium and Small genetic groups gave the best germination performance of 96.67 and 95.00% respectively and closely followed by the Brazilian Medium and Small with 93.33% and 90.00% respectively. The Brazilian Jumbo gave the poorest performance in terms of germination with 53.33%. Indian Madras was also observed to have very low germination of 61.67%. The results showed that nuts of small-medium size in both genetic populations had better germination than other nut size categories.

Survival counts of the cashew accessions were carried out at 2 and 7 months after transplanting (MAT) and presented in Tables 3 and 4 respectively. Percentage survival of cashew plants at 2MAT ranged between 67.50% in Indian Introduction-Madras and 95.50% in Brazilian-Large. Other genetic groups had over 75% survival suggesting better transplanting operation. The missing stands were subsequently gapped. However, observation at 7MAT showed a very sad situation with the number of stand/block ranging from 1 in Brazilian-Jumbo to 12 in Brazilian-Small. The sharp reduction in the number of surviving was traced to the Grass Cutter's attack at the onset of dry season.

Conclusion: Missing stands will be replaced during the 2006 planting season and cashew stands will be protected with wire gauze. Effort on regular weeding of the plot will be stepped up

Constraints:

- Non-availability of labour for regular weeding of the plot.
- Non-release of funds for the intercrops (cassava, oilpalm and pineapple)
- Non-availability of project vehicle.

Acknowledgement: The supports of Agricultural Superintendents in Plant Breeding, Agronomy, Entomology, Plant Pathology and Soil and Plant Nutrition who participated in the establishment of the plot is acknowledged and appreciated.

Table 1: List of the Cashew Accessions and their pedigree.

Accession / Pedigree	Nut size
Brazilian Jumbo-Oro Selections	16.0g and above
Brazilian Extra Large-Oro Selections	13.00 – 15.99g
Brazilian Large-Oro Selections	10.00 – 12.99g
Brazilian Medium-Oro Selections	7.00 – 9.99g
Brazilian Small-Oro Selections	3.00 – 6.99g
Indian Madras-Ochaja CRIN Selections	2.00g below
Indian Introduction Medium-Local-WNDC Iwo Selections	7.00 – 9.99g
Indian Introduction Small-Local-WNDC Iwo Selections	3.00 – 6.99g

Table 2: Germination performance of cashew germplasm accessions:

Accession	No of nuts sowed	No. of germinated nuts	Percentage germination
Brazilian Jumbo	60	32.00	53.33
Brazilian Extra Large	60	38	63.33
Brazilian Large	60	50	83.33
Brazilian Medium	60	56	93.33
Brazilian Small	60	54	90.00
Indian Madras	60	37	61.67
Indian Introduction Medium	60	58	96.67
Indian Introduction Small	60	57	95.00

Table 3: Survival Counts of cashew plants at 2MAT

Accession	No of stands/row				Total/block	Percentage survival
	Row 1	Row 2	Row 3	Row 4		
Brazilian Jumbo	8	7	8	7	30	75.00
Brazilian Extra Large	10	6	9	9	34	85.00
Brazilian Large	9	10	9	10	38	95.00
Brazilian Medium	8	8	9	7	32	80.00
Brazilian Small	9	7	9	9	34	85.00
Indian Madras	6	9	7	5	27	67.50
Indian Introduction Medium	7	10	9	8	34	85.00
Indian Introduction Small	10	10	8	9	37	92.50
Total/Mean					**266**	**83.13**

MAT: Months after transplanting.

Table 4: Survival Counts of cashew plants at 7MAT

Accession	No of stands/row				Total/block	Percentage survival
	Row 1	Row 2	Row 3	Row 4		
Brazilian Jumbo	0	1	0	0	1	2.50
Brazilian Extra Large	3	1	2	6	12	30.00
Brazilian Large	2	1	3	1	10	25.00
Brazilian Medium	6	3	1	1	11	27.50
Brazilian Small	3	2	4	3	12	30.00
Indian Madras	3	2	4	1	10	25.00
Indian Introduction Medium	3	5	2	0	10	25.00
Indian Introduction Small	2	1	1	4	8	20.00
Total/Mean					**74**	**23.13**

MAT: Months after transplanting.

CASHEW PROGRAMME (Leader:Dr. O. M. Aliyu)

Experimental Title: Study on the productivity of old cashew plantations (Aliyu, O. M).

Introduction: In the 1970s average nut yield of cashew was 0.12ton/ha while it increased to about 0.7ton/ha by the 1990s through research effort of CRIN scientists. However, this 0.7ton/ha is far below the 2.0tons/ha being recorded in other cashew producing countries like Cote d'Ivore, Kenya, Guinea Bissau, Mozambique and Tanzania. Recent characterization study in cashew showed that CRIN Iwo selections currently growing in the Institute cashew plots had individual tree yield ranging between 0.24kg and 32.69kg (Aliyu, 2004). These materials have estimated yield potentials ranging between 0.3ton/ha and 4.02tons/ha respectively. However, with this wide variability in nut yield, it is clearly showed that the cashew trees growing within the estate comprise mixture of very high and low yielding materials growing together. Therefore, it is suggestive that the proportion of the low yielding trees out-numbered the high yielding trees thus lowering the average nut yield. This perhaps gives pictures of average cashew farm in the country and the reason for 0.7ton/ha nut yield being recorded. In order to effectively tackle the problem of low yield in cashew, there is the need to carry out a study on the proportion of productive trees in our cashew plantations as a baseline data for meaningful yield improvement programme in cashew.

Objective: To determine the productivity of old cashew plantations towards unravel problem of low yield in cashew in Nigeria.

Materials and Methods: SS6 Cashew plot along nursery was selected at CRIN headquarters all surviving trees were labeled. Attempts were made to collect data on yield and its components. Data collected were summarized and presented in Table 1.

Results and Discussions: Table 1 shows the yield characteristics of cashew tree population in SS6 plot. For clarity, the trees were grouped into classes on the basis of their yield. The yield results obtained from these trees was far below the record obtained in 2000, 2001 and 2002 fruiting seasons. While, the average yield (nuts/trees) of the trees over those three years period ranged between 50 and 4920, the yield obtained during the 2005 fruiting season was between 0 and 2000 nuts/tree. It was however clearly evident that the cashew trees are long due for rehabilitation not for age but for lack of adequate maintenance. About 87% of the trees are interlocked with only few ones at the border row giving average fruiting performance. Based on the yield of these trees, only 13.33% produced nuts above 500.

Conclusion:: The result obtained from this work cannot be used to identify the poor trees among the population as defined in the objective of this study. To accomplish that objective, the trees must be rehabilitated using head-backing method and record on yield commences immediately after regeneration to identify the proportion of high yielding trees among the population.

Table 1: Yield of cashew trees in SS6 Plot at CRIN Headquarters for 2005.

Number of nuts/tree	Number of trees	Percentage of tree among the population in the plot
0 - 50	30	40.00
51 – 200	20	26.67
201 – 500	15	20.00
501 – 1000	6	8.00
1001 – 2000	4	5.33

CASHEW PROGRAMME (Leader:Dr. O. M. Aliyu)

Experimental title: Effect of application of synthetic hormones on the fruit-set in cashew (Aliyu O. M.)

Introduction: Low yield has been identified as the major limiting factor in cashew and studies had shown that application of synthetic hormones had increased fruit-set and yield in mango that belongs to the same family *Anacardiaceae* with cashew. There is the need to improve on the present level of nut yield of 0.7ton/ha to about 2.0tons/ha recorded in India and other major cashew producing countries in Africa, through application of synthetic hormones.

Objective: To increase cashew nut yield through foliar application of synthetic hormones.

Materials and Methods: Five synthetic hormones (GA_3, IBA, NAA, IAA and 2,4-D) of seven concentrations (0ppm, 10ppm, 25ppm, 50pppm, 100ppm, 250ppm and 500ppm) were used in this trial. Actively flushing twigs of two Brazilian accessions of about 5 years old were selected and labeled for the study. Each concentration of the selected hormones was spray at 4 weeks to the anthesis and each experimental unit was replicated thrice using cardinal position of canopy (Masawe *et al*., 1996; Aliyu and Awopetu, 2003). Data were collected on number of hermaphrodite per panicle and number of nuts per panicle.

Results and Discussion: Preliminary results obtained from the study showed significant effects attributable to hormones, concentration and genotypes. Figure 1 shows the summary performance of the hormones in terms of number of hermaphrodite flowers and number of nuts produced per panicle. It was evident that IBA tends to give the best result for both yield

attributes followed by IAA. However, twigs sprayed with GA_3 and NAA produce no flower at all suggesting their less suitability for yield improvement in cashew. The significant effect recorded for IBA and IAA over the control treatment is a promising result that tends to suggest that cashew yield can be improved upon by the application of synthetic hormone. Table 1 shows detailed yield attributes of cashew as affected by the application of synthetic hormones. It's however evident from this preliminary result that IBA and IAA at 100pp and

250ppm each proved to be more suitable than other concentrations. Similarly, 2,4-D gave best result at 100ppm.

Conclusion: The results obtained in this study seem to be promising but very preliminary. The trial will continue in 2006.

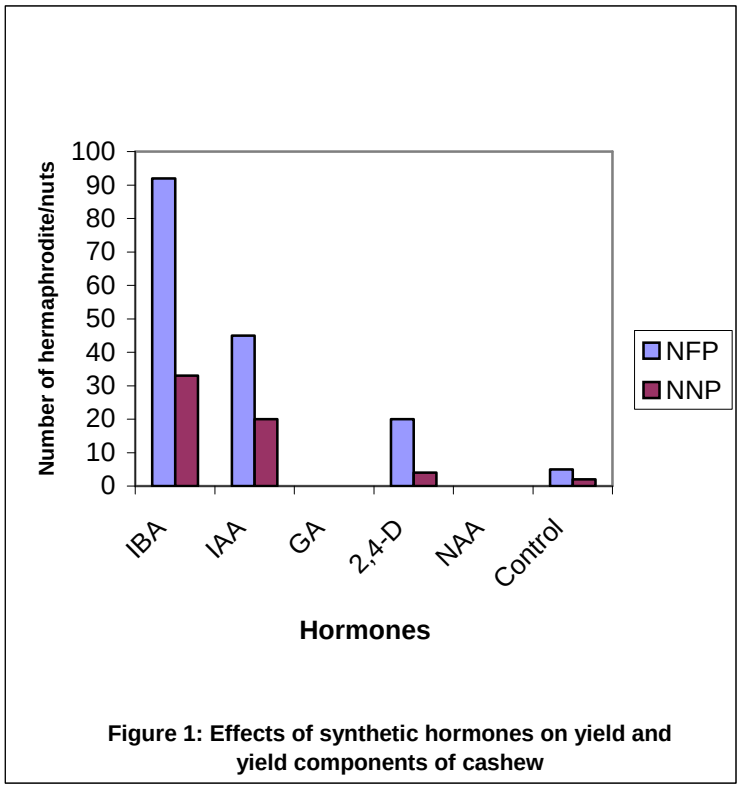

Figure 1: Effects of synthetic hormones on yield and yield components of cashew

Table 1: Effect of synthetic hormones on yield components of cashew

Hormones/Concentration	Number of hermaphrodite flowers/panicle	Number of nuts/panicle
IBA10	2	0
IBA25	5	4
IBA50	10	7
IBA100	50	13
IBA250	25	9
1BA500	7	0
IAA10	0	0
IAA25	2	0
IAA50	3	0
IAA100	30	10
IAA250	10	5
IAA500	0	5
GA10	0	0
GA25	0	0
GA50	0	0
GA100	0	0
GA250	0	0
GA500	0	0
24D10	0	0

24D25	0	0
24D50	6	0
24D100	12	4
24D250	0	0
24D500	2	0
NAA10	0	0
NAA25	0	0
NAA50	0	0
NAA100	0	0
NAA250	0	0
NAA500	0	0
Control (H_2O)	5	2

CASHEW PROGRAMME (Leader:Dr. O. M. Aliyu)

Experimental title: Incidence And Control Of Twig Die-Back In Young Cashew At Ibadan (Southwestern Nigeria) (L.A.HAMMED and A. R. ADEDEJI)

Introduction: Floral shoot dieback, a serious cashew disease caused by *Lasiodiplodia therobromae* (Pat) Griffon and Manbl, was first reported over three decades (1972) ago. Since then series of efforts have been made to control the disease (Olunloyo and Esuruoso, 1975). However, little attention had been given to twig dieback, an equally or more important disease caused by the same organism. Twig die back has remained one of the major delimiting factors to cashew production for decades, especially in newly established plots.

Objective: This study was therefore designed to determine the incidence of twig dieback on newly established cashew plots and its control using the combination of a fungicide and an insecticide.

Materials and Method: The plot, which was originally, established to study the field establishment of cashew as affected by nut-size and planting method, was a split plot in RCB with three replications. This superimposed experiment was necessitated when, about 50% of the infected plants' herbage dried. Moreso, 60% of the plant population assumed anthesis at 18 months after planting. Lest the infections interfere with flowering and fruiting, the trial was initiated.

The control method applied followed Olunloyo (1984) with some modifications. Champ D-P (Copper based fungicide) and Unden (insecticide) were used in combination 1.5ml of 4.0g/l:1.0ml of 4.0ml/l respectively. The pesticide combination was sprayed monthly while the unsprayed served as a control. The % incidence was computed based on the number of infected and total twigs.

Results and Discussion: Generally, if the twig die-back infection was left unchecked, the infected cashew plants would recover from the infection with time. The time of recovery, as shown in (Figures 1-4) would be late for the plant to produce crop yield before the start of the rain, thus, a loss to cashew farmers.

The madras was most susceptible in August, 62.7% of its entire shoot (twig) were infected. This was significantly different from jumbo and medium that had respectively 45.2% and 50.5% of their total number of shoots infected by the disease (Figure 1). The increased % incidence occasioned by the treated cashew plants in September was suggestive of the

possibility of the insect vectors sucking on the young flushes' twigs the previous month thus, rendering the spraying ineffective in the three nut sizes. In all, the three nut sizes of cashew used for this trial did not significantly responded differently ($P<0.05$) to chemical sprayings, i.e. there was no significant ($P<0.05$) variations due to nut size in % incidence of the treated cashew plants. Among the non-treated cashew plants, madras recorded lowest % incidence i.e. madras had a faster natural recovery rate (Figure 1).

The effectiveness of the chemical applications on plants raised from jumbo sized nuts of cashew was evidenced (Figure 2) throughout the period of applications, except, in September when the % incidence in the treated was significantly ($P<0.05$) higher than that of the non-treated cashew plants. This observation affirms the earlier suggestive reasons in (Figure 1).

Besides, (Figure 2) also depicts that cashew raised from jumbo sized nuts have least natural recovery. Thus, if the infection is left uncontrolled in the plants, no single nuts may be harvested in that fruiting season. However, treated and non-treated cashew plants raised from medium size nuts of cashew were not significantly different ($P<0.05$) throughout the period of applications, (except in November). This is an indication of its natural recovery rate, but at off-season (Figure 3). The cashew plants raised from madras nuts had results (Figure 4) similar to those of the medium nuts (Figure 3) above. These plants recorded the least % incidence with time. There was no significant effect in % incidence between the treated and non-treated plants of cashew raised from madras throughout the period of applications (Figure 4).

The contributions of the planting method (potted seedlings, bare-root seedlings and direct seeding) of these cashew plants to the infection rates that was investigated indicated that, the factor had no significant contributions to the % incidence of twig die-back in cashew throughout the period of observations, irrespective of whether the plant is treated or non-treated. Meanwhile, in September, the % incidence in the treated plants raised through bare-root seedling was highest (68.8%) which was significantly different ($P<0.05$) from those raised through potted seedlings (56.5%). Comparing the effectiveness of the chemical with respect to planting method indicated that, almost throughout the period of applications there were no significant effects ($P<0.05$) in % incidence between the treated and non-treated plants of cashew irrespective of the planting method. The exception was in November when the % incidence was significantly ($P<0.05$) reduced (23.2%) in treated as against the untreated (39.3%).

Conclusion: The applications of the mixture of an insecticide and a fungicide reduced the % incidence of the twig die-back infections in cashew. The reduction was almost not statistically significant ($P<0.05$) from the non-treated plants. The nut yield obtained from the treated as against the non-treated plants of cashew necessitates retrial of this experiment and validation of the results. The retrial, besides, needs to begin earlier prior to the plant's flushes for reproductive phase, which begins in August. The natural recovery rates of cashew plants occur at a period when the plant is expected to be fruiting. The plants would then be flushing when expected to be fruiting and when harvesting is supposed to be in progress. Fruits borne by the naturally recovered plants neither mature nor ripe before the commencement of the rains. All the newly formed fruits and the hermaphrodite flowers become wasted due to rains and rainstorm.

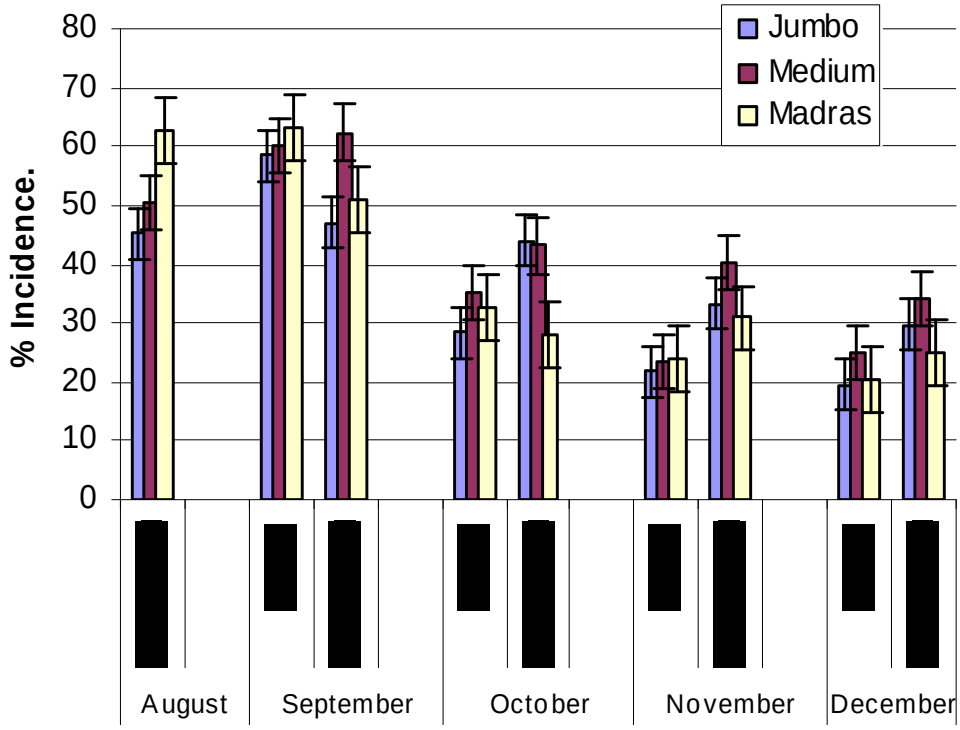

Figure 1: Control of twig die-back in cashew as affected by nut size in Ibadan.

CASHEW PROGRAMME (Leader:Dr. O. M. Aliyu)

Experimental title: Effects of nut size and form on seedling emergence and performance of cashew in the nursery (Adeyemi, E.A; Hammed, L.A).

Introduction: Hitherto floatation test prior to sowing has been recommended for germination test in cashew. Recent research reports have revealed the limitation of this method. Adeyemi and Hammed (2003) reported that both sinkers and floaters of medium nut size are equally good as seed. Further studies revealed that floatation in cashew is dependent on nut size. The need to determine the emergence rate of sinkers and floaters of different nut sizes of cashew and study the seedling performance of sinkers and floaters of the different nut sizes form the justification of this experiment.

Objectives: (i) To study the emergence rate of sinkers and floaters of different nut sizes of cashew

(ii) To evaluate the seedling performance of sinkers and floaters of different nut sizes of cashew.

Materials and Methods: Five nut sizes of cashew viz: madras (<2g), small (> 2 <6g) medium (> 6 <8g) large (> 8 <12g) and extra large (> 12 < 16g) obtained from CRIN Ochaja substation plantation were used for the experiment. Sinkers and floaters of each nut size represent nut form at 2 levels while the different sizes represent nut size at 5 levels. The experiment is therefore factorial laid out in split plot design with 4 replications at CRIN central nursery in Ibadan.

Four nuts of each form and each size were sown in May 2005 at one nut per polythene pot filled with topsoil. The polythene pots were watered as necessary. Emergence rate was taken at 3 and 4 WAS (weeks after sowing) Two pots per treatment were tagged for data record of morphological parameters (plant height, stem girth, number of leaves, leaf area and number of shoots) taken at 4, 6 and 8 WAS. Plant samples were harvested at 8 WAS and oven dried (at 80^{o}C for 48 hours) to determine dry matter yield. Data generated were subjected to analysis of variance and means were separated using least significance difference.

Results and Discussions: Sinkers of medium nut size gave the highest emergence (100.00) at 4 WAS (table 1). This was followed by extra large, large, small and madras in that order. With the exception of the medium nut and small nut that tied with large nut, emergence rate of sinkers was directly related to nut size . In floaters large nut gave highest emergence (68.75) followed by medium, extra large, small and madras in that order. This also showed a direct relationship between emergence and nut size with the exception of extra large nut.

Table 2 showed that both nuts size and nut form had effect on germination in cashew. Table 1 above corroborated this. There was however no interaction between nut size and nut form. At 4WAS comparisons of mean germination rates as affected by nut size (table 3) showed that there was no difference between extra large, large and medium; extra large and small. Conversely, medium nut was higher in emergence than small and madras; extra large than madras. Sinkers were better than floaters in germination. Comparisons of plant height (table 4) of the nut sizes and forms followed the same trend throughout the duration of the experiment. The plant heights were directly related to the nut size. The higher the nut size the higher the seedling in height, though the higher height in extra large nut was not different from large and medium nut as reported for germination rate. Plant height of extra large nut was different from small nut contrary to the observation for germination rate. Sinkers were different from floaters as reported for germination rate.

The stem girth (table 5) followed the similar pattern of no difference among extra large, large and medium nut but difference between extra large and small nut as reported for plant height. There was no difference in girth between sinkers and floaters.

The number of leaves, leaf area and number of shoot (tables 6, 7 and 8) assumed similar trend as reported for stem girth. The dry matter yield followed similar pattern.

Summary & Conclusion:

Farmers should sort their procured seed lots into sizes and forms before sowing. While floaters of extra large, large and medium nuts could be used as seed at 2 nuts per pot, to be thinned to one as necessary, floaters of small and madras were not fit as seed. They are better used, as consumables Madras should be sown at 2 nuts per pot but at 1 nut per pot for the other nut sizes.

Table 1: Percentage mean emergence of cashew nut as affected by nut size and form at 4WAS

Nut size	Nut forms	
	Sinkers	Floaters
Extra large	87.25	56.25
Large	81.25	68.75
Medium	100.00	62.50
Small	81.25	25.00
Madras	62.50	18.75

Table 2: Germination rates of cashew nuts as affected by nut size and forms in the nursery at 3 and 4 WAS (n = 160)

Observation period	Mean	Nut size	Nut form	Nut size x Nut form
3WAS	53.75	3.22*	23.12**	0.07 ns
4WAS	65.00	18.07*	18.09**	0.73ns

Table 3: Comparisons of mean germination rates of cashew nuts as affected by size and form of nuts at 3 and 4 WAS

Treatment	Mean Germination	
	3 WAS	4WAS
Nut size:		
Extra large	56.25	71.88
Large	56.25	75.00
Medium	75.00	81.25
Small	40.63	53.13
Madras	40.63	43.75
LSD (0.05)	24.42	19.81
Nut Form		
Floaters	32.50	47.50
Sinkers	75.00	82.50
LSD (0.05)	18.84	17.54

Table 4: Comparisons of mean plant height (cm) of cashew seedlings as affected by size and form of cashew nuts in the nursery

Treatment	4WAS	6WAS	8WAS
Nut size:			
Extra large	20.94	27.00	29.31
Large	19.56	27.00	28.31
Medium	19.90	23.75	26.75
Small	13.06	15.56	16.88
Madras	7.66	9.00	9.63
LSD (0.05)	6.46	5.4	5.99
Nut Form			
Floaters	14.49	17.28	18.58
Sinkers	17.97	23.65	25.78
LSD (0.05)	2.84	2.63	3.25

Table 5: Comparisons of mean stem girth (cm) of cashew seedlings as affected by size and form of cashew nuts, in the nursery.

Treatment	4WAS	6WAS	8WAS
Nut size:			
Extra large	0.49	0.54	0.57
Large	0.49	0.55	0.58
Medium	0.50	0.54	0.55
Small	0.34	0.39	0.38
Madras	0.21	0.24	0.24
LSD (0.05)	0.11	0.11	0.11

Table 6: Comparisons of mean number of leaves of cashew seedlings as affected by size and form of cashew nuts in the nursery

Treatment	4WAS	6WAS	8WAS
Nut size:			
Extra large	7.38	12.00	13.63
Large	8.75	13.38	15.13
Medium	6.38	10.13	10.30
Small	4.25	6.25	6.50
Madras	3.75	5,75	6.38
LSD (0.05)	3.17	5.19	5.13
Nut Form			
Floaters	n.s	7.30	8.05
Sinkers	n.s	11.70	12.60
LSD (0.05)	-	2.79	2.87

Table 7 : Comparisons of Mean leaf area (cm2) of cashew seedlings as affected by size and form of cashew nuts, in the nursery.

Treatment	4WAS	6WAS	8WAS
Nut size:			
Extra large	44.34	47.60	52.33
Large	39.16	44.35	48.21
Medium	34.90	35.16	39.08
Small	21.17	22.19	26.52
Madras	10.12	11.37	16.91
LSD (0.05)	11.28	9.09	11.70
Nut Form			
Floaters	25.25	n.s	31.55
Sinkers	35.03	n.s	41.67
LSD (0.05)	6.08	-	6.38

Table 8: Comparisons of mean number of shoot of cashew seedlings as affected by size and form of cashew nuts

Treatment	4WAS	6WAS	8WAS
Nut size:			
Extra large	n.s	2.00	2.25
Large	n.s	1.63	1.63
Medium	n.s	1.88	2.13
Small	n.s	0.88	1.00
Madras	n.s	0.75	0.75
LSD (0.05)	-	1.01	1.13
Nut Form			
Floaters	0.85	1.00	0.95
Sinkers	1.40	1.85	2.15
LSD (0.05)	0.42	0.76	0.63

Table 9: Comparisons of mean dry weight (g) of cashew seedlings as affected by size and form of cashew nuts, in the nursery

Treatment	8WAS
Nut size:	
Extra large	3.92
Large	3.69
Medium	2.24
Small	1.23
Madras	0.81
LSD (0.05)	1.09
Nut Form	
Floaters	1.95
Sinkers	2.81
LSD (0.05)	0.53

CASHEW PROGRAMME (Leader:Dr. O. M. Aliyu)

Experimental Title: Growth and physiological development of Cashew (Anacardium occidentale, L.) as affected by nut size in the nursery. (L. A. Hammed)

Introduction: There is a considerable volume of work done on dry matter (DM0 production and its partitioning into different organs in oil palm (both seedlings and matured crop). Nutrient contents and uptake by different oil palm organs have also been intensively investigated. These had contributed immensely to field establishment and production of the crop. The information from physiological development in oil palm seedlings had been used to determine the stability of the crop when transplanted into the field. Besides, the computation of nutrient uptake by different organs of the crop provides useful information on the nutrient demand of oil palm both in the nursery and on the field. 9Gunn et al, 1961; Lucas, 1977 and 1980). Similar efforts have been made in cocoa. Nothing of such as ever existed in cashew researches. The high mortality of cashew seedlings that characterizes the crops field establishment might not be totally unconnected with this deficiency.

Objectives:

(i) To study the morphological and physiological growth and development of cashew as affected by nut-size in the nursery.

(ii) To determine the nutrient uptake by different plant organs of the crop

Materials and Methods:

The experiment, laid out in completely randomized design with four replications, involved the three distinct nut-sizes of cashew: Jumbo (>16g) and Madras (<2g) (that respectively constitute the largest and smallest nuts of cashew) while the third one is the medium (8-12g). Two plant samples (seedlings taken monthly for physiological operations in the laboratory.

Results:

The nursery aspect of the project is completed. Its statistical analysis is in progress. Besides, the analyses of the nutrient content of the plant samples are yet to complete. Calculation of the nutrient uptake of the cashew seedlings in the nursery is in progress.

CASHEW PROGRAMME (Leader:Dr. O. M. Aliyu)

Experimental Title: Early field establishment of cashew (A. occidentale, L.) as affected by seedling age (L. A. Hammed).
Introduction: Cashew as a tree-crop that readily germinates is faced with a problem of field establishment. The idea of equating cashew with cocoa and thus being transplanted at about the same age is not tenable in crop physiology. The rapid and complete germination of cashew nuts (2-4 weeks after planting) suggests some peculiarities in its transplanting age, so as to avoid the mistakes of transplanting overgrown seedlings (or saplings), which can never survive the transplanting shock.
Objective: To determine the age at which cashew seedlings should be transplanted to the field.
Materials and Methods: The experiment, laid out in randomized complete block (RCB) with three replications and seven treatments, was re-established in 2003 at zone –1 of the institute. The treatments (seedling age) included 3-8 weeks after planting (WAP) and three months after planting (MAP). The variations in the seedling age (as enumerated by treatment definition had earlier been made to come in the nursery., during nut sowing between March and June 2003.
Result:
Data collections on the plants' morphological variables have been completed. Nut yield with respect to respective treatments is in progress. Statistical analysis of the data collected iis in progress.

CASHEW PROGRAMME (Leader:Dr. O. M. Aliyu)

Experimental Title: Early field establishment of cashew (*A. occidentale*, L.) as affected by nut-size and planting method (L. A. Hammed).
Introduction: The remarkable earliness in the completion of germination of cashew nuts (2-4 WAP) in the nursery compared to other tree crop commodity of similar international commerce, and its attendant problems of field establishment, made the earlier cocoa researchers like Adenikinju, et al, (1989) and Opeke (1997) advocated for a peculiar method of cashew cultivation especially field establishment. Since the ultimate success of any tropical tree crop primarily depends on the establishment of a uniform population of vigorous plants, thus, knowledge of early field establishment capabilities on the resultant cashew seedlings from different nut-sizes and established through different planting methods would constitute tremendous selection tools for cashew researchers and selections could be effective for these traits.
Objectives:
(i) To study the effects of nut size on early field establishment of cashew.
(ii) To study contributions of the planting method to early field establishment of cashew
Materials and Methods: It is a factorial experiment laid out in split plot design in which the main plot factor (nut-size at 3 levels jumbo, medium, madras) is laid out in RCB with three replications. The subplot factor includes the planting method: potted seedlings, bare-root seedling and direct seeding. The experiment was established in 2002.
Results: The statistical analysis of the data generated is in progress. Harvest of nut yield, with respect to each treatment, is in progress.

CASHEW PROGRAMME (Leader:Dr. O. M. Aliyu)

Experimental Title: Effect of maize intercrop on early field establishment on cashew (*A. occidentale.* L.) grown at different planting densities.
Introduction: Cashew is grown in all ecological zones of the Nigeria, but extensively grown in the north-central or middle belt region of country. Similarly, maize is a universal crop that is of widest acceptability in all ecological zones of the country. During the establishment years of cashew, almost all crops plots (including those of affluent farmers) are normally planted to maize. The study of contributions of maize intercrop or otherwise to field establishment of cashew will provide useful information either in support or against the farmers practice.

Objectives:
(i) To study the effects of planting density per hectare on field establishment of cashew.
(ii) To investigate the contributions of maize intercrop on field establishment of cashew.
Materials and Methods: It is a factorial experiment, laid out in split plot in RCB with three replications. Cashew planting density (277, 493 and 1,111 plants/ha) and maize intercrop (80,000, 53,000 and zero plants/ha) constituted main plot and subplot factors respectively. The experiment was re-established in 2003.

Result: The closure of the plant canopy of cashew planted at 1111 plants/ha obstructed the planting of maize for the 4th time. However, statistical analysis of the data generated is in progress.

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Title of Programme: CASHEW PROGRAMME (Leader Dr. O.M. Aliyu)

Experimental title: Effect of Storage periods on emergence and growth of cashew with two sizes (Adeyemi, E.A.)

Introduction: The propagation of cashew (*Anacardium occidentale* L.) is usually through its nuts. Nuts are harvested between December and April, a period that is not favourable for rain-fed field establishment, which is the common practice among Nigerian farmers. It becomes imperative to store the harvested nuts till when rains become steady for plantation establishment. The need to study the effect of nut storage on its emergence and growth forms the justification of this study.

Objective: To study the effect of nut storage on its emergence, seedling growth and vigour.

Materials and Methods: Jumbo (> 16g) and medium (6-8g) cashew nut sizes harvested freshly from Oro in Kwara state and CRIN headquarters in Ibadan respectively were used for the experiment. It was a factorial experimental with nut sizes and storage periods as factors A and B respectively. Nuts were subjected to 12 months storage period at a month interval. Nuts sown at harvest serve as control. There were 26 (13 x 2) treatments in four replications at CRIN central nursery in Ibadan. Weights of nuts were taken at harvest and prior to sowing after each storage period. Emergence record up to 4 WAS (week after sown), morphological parameters from 4-12WAS and dry yield matter were taken.

Results: Data are being collated for analysis.
The experiment is in progress.

CASHEW PROGRAMME (Leader:Dr. O. M. Aliyu)

Experiment Title : Effects of sowing depth on germination of cashew (Adeyemi, E.A.)

Introduction: Cashew (*Anacardium occidentale* L.) is a fast growing tropical crop that can be sown in-situ. Preying on the sugary cotyledons of emerged seedlings of cashew by predators (rodents, monkey etc) militate against in-situ sowing which is economical and less laborious in comparison to seedling production and transplanting to the field. The problem of predators will be averted if cashew could be sown at a depth that will bury the cotyledon in the soil and not inhibit emergence. These form the justification of the study.

Objective: To determine nut-sowing depth that promotes emergence as well as prevents destruction of seedlings by pests.

Materials and Methods: There were five sowing depths (2.5, 5.0, 7.5, 10.0 and 12.5cm) investigated with two nut sizes (Jumbo and medium) of cashew. The treatments (5x2) = 10) were laid out in a randomized complete bock design in four replications at CRIN central nursery in Ibadan. Data on days to emergence, positioning of seedling cotyledons, and morphological parameters of seedlings were recorded. Seedlings were harvested at 14 weeks after sown (WAS) for dry matter yield determination.

Results: Collation and analysis of data are in progress.

CASHEW PROGRAMME (Leader:Dr. O. M. Aliyu)

Experimental Title: Effect of the shade on establishment of cashew plantation in two ecological zones of Nigeria (Adeyemi, E.A)

Introduction: Tree crops such as *cacao, coffea,* have been reported to respond favourably to shade in their field establishment and this has become a common practice among farmers. The need for shade in the establishment of cashew plantation is still controversial among many authors. It is therefore necessary to study the effect of shade on the establishment of cashew in Nigeria where rainfed agriculture is the mainstay of farmers.

Objectives

(i) To ascertain the relevance of shade in the establishment of cashew plantation

(ii.) To study the effect of shade on the chemical properties of the soil.

Materials and Methods: Plantain plant was used to provide shade at seven levels of population and geometry for each of the two nut sizes of cashew (Jumbo and Medium) established in zone 1 at CRIN headquarters in Ibadan, a rainforest zone. There were therefore 14 treatment combinations laid out in randomized complete block design in three replications. Pre-establishment soil sample was taken for

physico-chemical analysis. The two nuts sizes were sown in-situ at 6m x 6m x 0.7.5m on 0.65ha area of land.

Data were recorded on emergence rate, positioning of cotyledon, morphological parameters monthly from 3 months after sown (MAS) and soil moisture reading monthly from 4MAS.

Results: Data collection and collation are in progress.

Constraints: Unavailability of fund prevented establishment in Ochaja, which was to serve as derived savanna zone.

CASHEW PROGRAMME (Leader: Dr. O.M. Aliyu)

Experimental title: Ecology of the cashew leaf miner, *Acrocercops synagramma* Meyricki (Lepidoptera: Lithocolletidae). (Okelana, F.A. and J.C. Anikwe)

Objective: To monitor the occurrence of the cashew leaf miner, *A. synagramma* on cashew at CRIN Headquarters.

Methodology: Twenty stands of cashew at each of two locations viz; around the office complex and nearby North plot at CRIN Headquarters were selected randomly, every week, making a total of 40 stands. Four branches at hand height were chosen per tree and the number of leaves with active (fresh) mines of the pest were counted and recorded. Total and mean weekly values of mines per month were computed.

Results: The cashew leaf miner, *A. synagramma* occurred throughout the twelve months of the year at both locations. A peak population of the pest was recorded in June around the Office Complex and in October and November on the North plot stands. There was a generally higher incidence of the pest on the office complex stands than those at the north plot as presented in Table 1. Tender cashew leaves were more susceptible to the miners' attack than the old leaves. Studies on the population of the pest will continue while other aspects of studies on the pest may be embarked upon in 2006.

Table 1: 2005 Incidence of the cashew leaf miner ***A. synagramma*** on cashew at two locations at CRIN Headquarters, Ibadan.

	Mean weekly number of leaves with fresh mines	
Months	Office Complex	North Plot
January	12.0	7.5
February	7.0	5.6
March	5.5	2.8
April	5.4	2.1
May	14.3	5.3
June	29.0	8.4
July	16.0	10.0
August	7.0	5.0

September	18.0	9.0
October	14.0	11.0
November	20.0	11.0
December	15.0	10.0

Title of Programme : CASHEW PROGRAMME (Leader: Dr. O.M. Aliyu)

Experimental title: **Host status of Cashew seedlings to** *Meloidogyne incognita* **(Orisajo, S.B., Fademi, O.A., Okeniyi, M.O.)**

Introduction: Root-knot nematodes, *Meloidogyne* species, are one of the most widespread pests limiting world agricultural productivity (Taylor *et al.,* 1982). Root-knot nematodes are very destructive to tree crops like cocoa (Afolami, 1981; Luc *et* al., 1990), coffee (Huang *et al.,* 1984; Lordello, 1984) and tea (Martin, 1962; Yu Sheng-fu & Xia Bing, 1987), but the host status of cashew has not been determined. This experiment was therefore carried out to determine the resistance or susceptibility cashew to this ubiquitous nematode.

Objectives: To determine the effect of cashew seedlings to *M. incognita* infection.

Materials and Methods: Two varieties of cashew nuts (Brazillian and CRIN elite) were planted each in 2kg polyethylene bags filled with sterilized topsoil used as pots. The pots were inoculated with 5,000 *M. incognita* eggs obtained from the culture on the roots of *Celosea argentea* using Hussey and Barker (1973) sodium hypochlorite (NaOCl) method two weeks after plant emergence, uninoculated served as control. Each treatment was replicated three times and set up in completely randomized design. Normal watering of the plants was done and regular observations of the seedlings were carried out weekly for symptomatic infections The experiment was terminated 24 weeks after inoculation. Watering was stopped one week prior to the termination of the experiment. Thereafter, soil in each of the seedling pot was turned into a dry bowl, root system carefully excised and placed in a labelled polythene bag. The roots were examined for galls presence.

Results and Discussion: Yellowing of the leaves, stunted shoot and presence of small galls with some rotten root typical of *M. incognita* infection were observed on the root of inoculated cashew seedlings. This was not evident in the control (uninoculated)

Summary and Conclusion: This the first report case of the effect of root-knot nematode on cashew seedlings in Nigeria to the best of our knowledge. It is a preliminary work. Further research should be carried out, both in the nursery and the field.

Table 1: Effect of root-knot nematode on cashew seedlings

Accession	Plant height (cm)	Stem girth (cm)	Gall index
Brazilian (Ino)	**34.00b**	**0.53b**	**3**
(Un)	**36.98a**	**0.70a**	
CRIN elite (Ino)	**33.50b**	**0.51b**	**3**
(Un)	**37.10a**	**0.65a**	

Means followed by the same letter in the same column are not significantly different (P = 0.05).

Note: Ino = Inoculated; Un = Uninoculated

Title of Programme: CASHEW PROGRAMME (Leader Dr. O.M. Aliyu)

Experimental title: Sources of Inoculum in the yearly re-infection of cashew tree by the Inflorescence Blight fungus, *Lasidioplodia theobromae*. (Otuonye, A.H., Agbeniyi, S.O. and Dongo, L.N.)

Introduction: The need for effective control of the yearly menace of inflorescence dieback disease caused by the fungus *Lasiodiplodia theobromae*, which have lead to an average of 38.70% loss per hectare in total cashew nut yield (Olunloyo, 1979), have assumed a greater dimension presently, despite the application of chemical pesticides, all-year-round, to reduce the incidence of this disease. The shortcoming in achieving effective control of the disease with chemical pesticides resulted in seeking alternative measures to halt the inimical progress of this disease.

With this focus, the medium of fungal survival during the absence of flowers on cashew tree for the yearly infection were then directed to the soil and vegetations found on/and around cashew plots reported by Kranze *et. al.,* (1978) to host the pathogen.

The soil, since the sixties, has been implicated as the major source of inoculums for large number of pathogens that all year round infect plantation crops through the activities of soil moving ants, insects and rain splashes, (Okaisabor, 1965: 1971, Gorenze, 1970 and Evans, 1971).

Objective: The present objective therefore, is to identify the source of inoculum and the routes of infection of the fungus with the view of removing these barriers to achieve cost effective control measures.

Materials and Methods: The present study was located at the 'CRIN' headquarters, Ibadan, and was carried out in June 2004 and May 2005, when there were no cashew flowers on the trees. The experimental layout was CRD (Complete Randomized design).

Soil samples were randomly collected from five (5) different locations in plot S1/1 and SS6 in Zone 6 at depths of 0-15cm, 15-30cm, with the aid of graduated soil Auger. The soil samples, which were collected from under cashew canopies close to the trees, were put in sampling bags, labeled and then taken the laboratory for examination.

The laboratory sampling procedure used for the detection of soil fungi colony was the 'dilution plate' technique described by R.T.V. Fox (1993). The 'dilution plate' technique was preferred

to 'soil baiting' because of its workability. That is, the 1ml aliquot of the spore suspension from the soil dilution series dispersed on agar medium may give near purified fungi cultures, thus, making the isolation and identification process easy.

5g of soil were weighed out each, using electronic balance from the labeled samples obtained from various depths. These samples were transferred to 25mls graduated sterile test tubes containing 10ml of sterile water. These test tubes were labeled and covered with the test tube cover and agitated by shaken very well. 1ml aliquots of the suspension from these tubes were transferred with a sterile pipette to other tubes with 9ml sterile water. These tubes were agitated in turn and a fresh sterile pipette used in repeating the process. This was continued till the sixth dilution. A 1ml aliquot of the suspension was taken with a fresh pipette from these dilutions after further agitation and few drops transferred to 9cm diameter sterile disposable plastic Petri-dishes containing 'Lab M' Peptone water agar medium amended with 10% lactic acid to inhibit bacteria growth. This was replicated 2 times. The plates were labeled and incubated in the dark with the aid of Gallencamp incubator at a temperature of $25^{0C} \pm 2^{0C}$. After 72 hours the plates were examined for fungal growth. Consequently, the ensuing fungal cultures were sub cultured to obtain pure cultures. Microscopic examination was done with the aid of Olympus microscope on these pure cultures to identify the fungi colony. The frequency of occurrence of the fungi obtained was then calculated by using (Britton *et. al.,* 1983).

Results: The results obtained are presented in tables 1 and 2. The tables 1 and 2, clearly shows the presence of other organisms, but the target organism, *Lasiodiplodia theobromae* is not one of the soil inhabitants, thus, was not detected. Investigation to find out if some selected crops found around cashew plantation act as an alternate host to *Lasiodiplodia theobromae* and *in-vitro* trial of copper based fungicides to control the pathogen continues this year 2006.

Table. 1. Fungi Isolated From The Soil.

Fungi Isolated.	**Soil**			
	2004		**2005**	
	0 – 15cm	15 – 30cm.	0 – 15cm	15 – 30cm.
Lasiodiplodia theobromae	-	-	-	-
Rhizoctonia spp.	+	+	+	+
Rhizopus spp.	+	+	+	+
Fusarium spp.	+	+	+	+
Mucorales spp.	+	+	+	+
Penicillium spp.	+	+	+	+
Trichoderma spp.	+	+	+	+
Yeast	+	+	+	+
Others	+	+	+	+

-: - Not Present.

-: + Present.

Table. 2. Frequency of occurrence of fungi isolated from the soil.

Fungi Isolated.	**Frequency of occurrence**	
	2004	**2005.**
Lasiodiplodia theobromae	***0.00***	***0.00***
Rhizoctonia spp.	**0.05**	**0.03**
Rhizopus spp.	**0.02**	**0.04**
Fusarium spp.	**0.09**	**0.12**
Mucorales spp.	**0.11**	**0.14**
Penicillium spp.	**0.09**	**0.15**
Trichoderma spp.	**0.07**	**0.03**
Aspergillus spp.	**0.15**	**0.20**
Yeast	**0.30**	**0.26**
Others	**0.12**	**0.03**

ANNUAL REPORT 2005

CASHEW PROGRAMME

EFFECT OF MOISTURE REGIMES AND FREQUENCY ON GERMINATION OF CASHEWNUT.

Yabagi, A.A; Adebowale, L.A; Ogunlade, M.O and Hammed, L.A

INTRODUCTION

Cashew is a tropical crop, hardy in nature and grows well in all soils and whether conditions. It has problem of non uniform germination and emergence which has been reported upon. This condition has been associated with nut sizes, nut placement while sowing, moisture availability and nut viability.

However, some of these problems were researched into except moisture regimes and availability that are yet to receive any systematic research attention.

OBJECTIVES

1. This work is undertaken to determine moisture regime that cashew nuts require to germinate and emerge.
2. To determine the frequency of moisture application of cashewnuts during the germination period.

MATERIALS AND METHODS

Soils samples were collected randomly from cashew plantation at CRIN headquarters (0-30cm), air-dried and sieved through 2mm sieve. The representative sample was collected from the processed soil and analysed for particle size (Bouyoncos G. I. (1951) and water holding capacity (Gravimetric method).

The nuts were subjected to viability test (floatation) and viable once were sown in polythene bags filled with 2kg soils placed in the greenhouse.

It was 3 x 3 x 3 factorial experiment laid out in a splits plot design and replicated three times. The factors considered were: Nut sizes, (Jumbo, medium and madras) moisture Regime(MR): (75%, 50% and 30% field capacities) and moisture frequency(MF): (Once, twice, and thrice weekly). Data were taken on germination and growth parameters at four weeks after planting(WAP). They were subjected to ANOVA and means found significant were separated using DMRT.

RESULTS

Table I: Variations in the Performance of Cashew Seedlings as Affected by Nut Size, Frequency and Regimes of Moisture

	Variables	S	MF	MR	SxMF	SxMR	MR x MF	MR x MF x S
1.	Plant height	18.94**	0.45^{ns}	0.39^{ns}	0.35^{ns}	0.36^{ns}	0.20^{ns}	0.72^{ns}
2.	Stem girth	22.24**	0.29^{ns}	2.73^{ns}	0.71^{ns}	0.67^{ns}	0.89^{ns}	1.69^{ns}
3.	Number of Leaves	11.32**	0.14^{ns}	2.10^{ns}	0.64^{ns}	0.58^{ns}	0.77^{ns}	0.96^{ns}
4.	Leaf Area	37.08**	1.1^{ns}	0.57^{ns}	0.41^{ns}	1.46^{ns}	0.22^{ns}	0.86^{ns}
5.	Number of branches	3.75**	0.61^{ns}	0.84^{ns}	3.75^{ns}	0.42^{ns}	0.54^{ns}	0.62^{ns}

Note:

* Significance at P < 0.05

** Significance at P < 0.01

ns = Not significant at P < 0.05

Table 2: Comparisons of Mean Performance of Cashew Seedlings as Affected by Nut-size

Treatment	Plant Height	Stem Diameter	Number of Leaves	Leaf Area	Number of Branches
1. Jumbo	17.39[a]	0.49[a]	5.52[a]	42.22[a]	0.48[a]
2. Medium	15.46[a]	0.47[a]	5.52[a]	34.82[a]	0.0[b]
3. Madras	0.02[b]	0.18[b]	2.60[b]	6.20[b]	0.0[b]

Note: Means in the same column with same letters are not significantly different from one another.

Nut size showed significant effect on ($P < 0.01$) on all plant variable measured. The nuts appeared not responding to either moisture regimes nor frequency; thus the effect of these two factors were not significant at $P < 0.05$ (Table 1), Likewise, the effect of their interaction, either two or three factors interactions were also not significant at ($P < 0.05$) (Table 1).

Consequently, jumbo and medium nuts were recognised to have performed best in all the variables measured, except number of branches where only the jumbo nuts recorded multiple shoots at the time of observation (Table 2).

Madras nuts recorded the least performance in all plant parameters measured and the differences are highly significant at $P < 0.01$ (Table 2).

CONCLUSION

In this preliminary study, only the nut sizes showed significant effect on the plant growth parameters taken out of all the three factors considered. However, this experiment will be repeated in subsequent years but this will form the basis of our work.

Title of Programme: TEA PROGRAMME (Leader: R.R. Ipinmoroti)

Experimental Title: Preliminary screening of tea seedlings for resistance or susceptibility to root-knot nematode **(Orisajo, S.B., Fademi, O.A. and Okeniyi, M.O.)**

Introduction: The root-knot nematodes, *Meloidogyne* species are the most commonly encountered nematodes on tea in different tea growing areas of the world (Luc *et* al., 1990). Its first report on tea was from South India, where it was found to infest large numbers of tea seedlings (Barber, 1901). A survey carried out in Malawi in 1960 revealed that almost all the tea estates sampled were infected with root-knot nematodes (Martin, 1962). In China, the incidence of root-knot damage was found to be about 90% on tea seedlings and the death rate was estimated at 40% in the seriously affected nurseries (Yu Sheng-fu & Xia Bing, 1987). Since species of *Meloidogyne* have been encountered in almost all tea growing regions, the situation cannot be said to be different in Nigeria, and this has not been investigated on in Nigeria.

Objectives: To determine the susceptibility of tea seedlings to *M. incognita* infection.

Materials and Methods: Tea seedlings were obtained from CRIN substation at Kusuku. The pots containing the seedlings were inoculated with 5,000 *M. incognita* eggs obtained from the culture on the roots of *Celosea argentea* using Hussey and Barker sodium hypochlorite (NaOCl) method (1973). The experiment was terminated 12 weeks after inoculation. Watering was stopped one week prior to the termination of the experiment. Thereafter, soil in each of the seedling's pot was turned into a dry bowl, root system carefully excised and placed in a labeled polythene bag. The roots were examined for galls presence.

Results and Discussion: Small galls were noticed on the root of the tea seedlings. Some of the roots were rotten which is an evidence of the effects of the root-knot nematode, *Meloidogyne incognita*.

Summary and Conclusion: The result helped to inform that root- knot nematode can be problematic on tea farms in Nigeria, if the soil contains the eggs of *incognita*. It is a preliminary work. Further research would be carried out, both in the nursery and the field to confirm this.

Figure 1. Influence of *Meloidogyne incognita* on plant height of tea seedling

Title of Programme: TEA PROGRAMME (Leader: R.R. Ipinmoroti)

Experimental Title: Urea fortified organic manures on soil fertility, tea seedling growth and pruned yield nutrient contents in Ibadan **(Ipinmoroti, R. Rotimi)**

Introduction:
Tea cannot be produced optimally without fertilizer application. The supply of N, P, K and Mg in sufficient amount is needed for optimal growth and performance of tea plants on the field. Soils under tea production in Nigeria are of poor fertility status and lack the capacity to release sufficient nutrients for optimal tea performance; hence, there are need for external supply of nutrients to the soils by way of fertilizer usage. Presently there is short supply and high procurement cost of inorganic fertilizers in Nigeria. The poor farmers cannot afford this and therefore calls for alternative nutrient sources that are affordable by the farmers.

Objective:
This work was carried out to know the possibility of using some readily available organic wastes complemented with inorganic fertilizer for tea plant nutrition in Ibadan, Nigeria.

Materials and methods:
Cocoa pod husk, siam weed, tea fluff, cow – dund and poultry dropping were each mixed with NPK (5:1:1) at 4:1 ratio of N need of tea and applied at 150kg N/ha for tea seedlings growth at Ibadan. Growth parameters on plant height, girth, number of leaves, leaf area and branches were monitored for 12 months. The tea seedlings were pruned at 30cm height and pruned materials dried at 70^0C to constant weight in the oven. The dry matter weight was obtained, milled and analysed for N, P, K, Ca, Mg and organic carbon contents. Soil samples were collected, processed and analyzed for chemical components. The data obtained were subjected to analyses of variance and treatment mean differences were separated by LSD at P = 0.05.

Results and discussion:
The plant height, girth, number of leaves and leaf area values showed that tea plant responded favourably to the applied fertilizers compared to control (Table 1). This was positively reflected in the higher pruned dry matter yield (PDMY) for the fertilizer treated tea plants than for control. The enriched organic fertilizer materials resulted to higher PDMY values than NPK. The general superiority of the fertilizer treated tea plants over the control on the growth parameters and PDMY suggests the need for fertilizer addition, while the usage of the enriched organic fertilizer was better than NPK

Table1: Growth parameters and pruned dry matter yield (g/plant)

Treatments	Height (cm)	Girth (cm)	Number of leaves	Leaf area (cm^2)	Pruned dry matter yield
Cocoa pod husk	16.13	3.85	18	939.7	5.08
Cow-dung	32.50	3.86	17	1005	5.87
Poultry dropping	23.13	3.55	27	885.92	7.58
Siam weed	14.75	3.75	10	395.89	5.67
Tea fluff	25.83	4.50	22	726.25	8.14
NPK	24.38	4.33	21	966.9	4.48
Control	17.33	3.20	17	387.86	3.07
LSD (5%)	5.21	0.35	6.14	475.11	3.22

Analytical results of the pruned materials showed that fertilizer treatments gave significantly higher N, P, K, Ca and Mg values over the control (Table2). The enriched organic fertilizers were in most cases better than the use of NPK. The NPK and control treated tea plants were high in organic carbon contents. This coupled with the low macronutrient contents indicated that their PDMY contains mostly roughage and were of lower quality compared to the enriched organic fertilizer treated plants because quality of tea is based on the level of N, P, K, Ca and Mg contents, in addition to other chemical properties. The expected nutrient return to the field through the pruned materials ranged between 3.0 – 4.67kg N, 0.08 – 0.21kg P, 0.69 – 1.790kg K, 0.36 – 0.76kg Ca, 0.17 – 0.24kg Mg and 31.5 – 45.8kg organic carbon, compared to 1.17kg N, 0.05kg P, 0.25kg K, 0.69kg Ca, 0.18kg Mg and 40.84kg organic carbon by NPK. The values were least in the control compared to NPK, and highest in the urea enriched organic fertilizers. About 67.32% of the pruned contents are contained in the

leaf portion. The C/N ratio ranged from 9.81 – 10.5, which shows that the materials could easily decomposed and become beneficial to the soil, especially in improving the uptake of P.

Table 2: Nutrient contents (mg/plant) of pruned tea materials

Treatment	N	P	K	Ca	Mg	Organic C
Cocoa pod husk	250	7.03	23.39	19.83	8.81	2070
Cow-dung	230	6.75	13.17	21.96	12.09	2510
Poultry dropping	340	12.76	54.5	37.33	18.01	3620
Siam weed	220	7.47	32.31	26.72	13.53	2320
Tea fluff	280	9.25	15.18	22.59	14.39	2880
NPK	240	7.97	7.02	41.09	11.04	2460
Control	220	5.27	5.90	9.30	2.32	2340
LSD (5%)	18.1	2.13	6.22	10.3	5.68	154.1

The combined organic – inorganic treatments were significantly higher than the NPK and control in the reserved N, P, K, Ca, Mg and organic carbon built up compared to NPK and control (Table 3). The lower values in nutrients and organic carbon for soils under NPK and control treatments indicated that tea production would not be sustainable without external organic matter sources to modify the physical, chemical and biological conditions of the soil. The Mg values in soils treated to NPK and control were twice lower than those for organic – inorganic treatments. This shows that over time, the soils under NPK and control would be in acute supply of Mg and its deficiency symptoms. For sustainable management of the soil for optimal and quality tea production, the use of organic materials in combination with NPK would be more appropriate.

Table 3: Soil nutrient contents after 12 months of organic + NPK treatments

Treatment	N (g/kg)	P (mg/kg)	K (cmol/kg)	Mg (cmol/kg)	Ca (cmol/kg)	Organic C (gm/kg)
CPH	1.4	5.14	0.61	0.59	1.98	14.6
CDG	2.4	6.34	0.84	0.59	2.70	14.2
PDG	2.3	3.48	1.03	0.58	3.02	13.8
SWD	2.4	4.60	0.48	0.61	1.70	11.9
TFF	2.3	3.42	0.55	0.61	2.08	13.1
NPK	1.3	5.52	0.37	0.25	1.74	11.9
Control	1.0	2.00	0.48	0.24	1.32	10.2
LSD (5%)	0.37	1.08	0.26	0.19	0.25	0.81

TEA RESEARCH PROGRAMME
(Leader: R.R. Ipinmoroti)

Experimental Title: Evaluation of establishment ability of barer of bare-root transplanted selected tea clones in the lowland area of Nigeria. (Oloyede, A.A; Omolaja, S.S; Famaye, A.O. Muyiwa and Iloyanomo)

Introduction: Tea *Camellia sinensis* is an important export crop. Its production has however been limited to the mountainous area of Mambilla plateau. Taraba state where the land available for its production is limited as a result of other competing needs such as forest reserve, cattle ranching industrial and residential. Early studies have shown clones 143, 236, 318 and 35 to be adaptable to lowland area (Omolaja et al, 2001). Clone 143 was found by authors to be the most outstanding. To establish this crop in the lowland, planting materials is either brought from Mambilla or propagated in the lowland. The latter option has not been perfected (Oloyede et al, 2001). Transporting the cuttings with the bad of earth will be too costly and laborious hence the need to find away of less expensive technique to bring the cuttings from the natural area of cultivation (Mambilla plateau) become imperative.

Objective: The objective of this study is to find a cheaper method of transporting tea planting materials from the highland of Mambilla plateau for its establishment in the lowland area/s of Nigeria.

Materials and Methods: Tea clones viz: 143, 318 and 357 were brought from the Mambilla plateau in the first quarter of year 2005. There were six treatments comprising the following:

(i) Clone 143 with ball of earth
(ii) Clone 143 without ball of earth (bareroot)
(iii) Clone 357 with ball of earth
(iv) " " without ball of earth (bareroot)
(v) " 318 with ball of earth
(vi) " " without ball of earth (bareroot)

The experiment was laid out in randomized complete block design (RCBD) with ten replicates.

On survival, the bare rooted cuttings were potted and arranged under Gliricidia shade with those with the ball of earth and allowed to rest for 3 months to recover from transportation shock. They were consequently transplanted to the field.

The following parameters were measured, height, girth, number of leaves, leaf area, number of branches and survival. Data obtained were subjected to statistical analysis of variance and LSD was used to separate the means that were significance.

Results and Discussion: Results obtained from this experiment are presented in Table 1 below.

Table 1: Cumulative mean growth parameters and survival of tea.

Treatment		Height	Girth	NL	LA(cm^2)	No of branches	%survival
Clones 143	A	29.88	2.81	14.8	48.28	4.9	80
	B	23.44	3.26	8.3	50.03	3.0	80
Clone 318	A	22.50	3.36	14.2	45.22	3.2	40
	B	17.12	2.83	6.0	41.66	2.2	60
Clone 357	A	21.74	3.88	11.9	63.46	3.0	90
	B	17.25	3.23	4.7	35.06	2.3	60
Means		21.99	3.23	9.9	46.92	3.1	68.3
LSD(P=0.05)		4.31	0.36	3.90	8.72	0.9	16.74

Legend

A – cuttings with ball of earth NL = number of leaves

B – bare root cuttings. LA =leaf area

On survival, clones 357 and 143 were outstanding when transplanted with ball of earth with values of 90 and 80% respectively reported earlier to be most available clones 357 compare favourably with clones 143 in most of the parameters measured viz leaf area, girth, number of leaves except for height and number of branches where 143 was better. Percentage survival of 80, 60 and 60 recorded for bore rooted transplanting gave a ray of hope that given improvement in some cultural practices like mulching, prompt weeding and pest control, better survival and even growth shall be attainted.

Reference:

Omolaja, S.S, Esan, E.B and Obatolu, C.R. (2001). Production tea in lowland area of Nigeria. In CRIN Mandate Crops Stakeholders, Forum. 228 pp

Oloyede, A.A. Omolaja, S.S; Adedeji, A.R. (2001): evaluation of establishment abilities of cuttings at different tea clones from different media In: CRIN mandate Crops.

Tea Research ProgrammeAnnual Report, 2006
(Leader: R.R. Ipinmoroti)

Experimental title: Rapid method of leaf area determination in tea (Cammelia sinensis (Oloyede, A.A. and Ipinmoroti, R.R.)

Introduction: This study is concerned with finding a simple and rapid method of determining leaf area in tea through a non-destructive method. Many agronomic studies require the knowledge of leaf area measurement e.g. Leaf area index (LA1) which is a measure of the photosynthetic index for crop plants, is dependent on leaf area. Net assimilation rate of crops is also dependent on leaf area. The expensive nature of electrian folio meters make them unavailable to scientists in the developing countries like Nigeria (agronomists), plant breeders etc) that may need them.

Objective: The objective of this study therefore is to find a simple rapid non-destructive infloid of determining leaf area in tea.

Materials and Methods: Twenty cuttings of tea, clone 143 were collected in Fbruary 2005 for this study. Number of Leaf per stand range between 9-24. From each stand the following parameters were measured Length (L) broadiest width (B) of all leaves, LXB of Lower, middle and last leaf, LXB of middle leaf and also graph values of the above mentioned parameters standing for actual leaf area. The data so collected were subjected to descriptive statistics and correlation analysis to see how well related the various parameters. Meter rule was used to measure LXB while the actual area was determined by tracing the Leaf edges on a graph sheet.

Results and Discussion: Table 1 shows the various variables, their mean values, standard deviation, minimum and maximum values and number of input

Table 1: Descriptive statistics on the variables.

Variable	Mean	Standard Dev.	Min.	Max.	n
A	17.50	4.26	9.0	24.00	20
B	34.33	6.45	27.4	54.60	20
C	33.80	9.08	17.0	53.30	20
C	37.45	10.77	24.8	60.71	20
E	24.70	3.78	18.91	35.78	20
F	24.18	5.38	13.96	33.96	20
G	27.32	7.11	16.60	42.82	20

A = number of leaves per plant; B = Length x = Breadth of all leaves C= Length x Breadth of lower, mid and last leaf: D = length x breadth of mid leaf) E = values (leaf area of all leaves) F= Leaf area lower, mid and uppermost leaf and G = leaf area (Graph) of midleaf.

Table 2: Correlation matric on leaf area determination in tea showing interaction of variables

Variables	A	B	C	D	E	F	G
A	1						
B	0.408^{ns}						
C	-0.131^{ns}	0.492^{**}	1				
D	-0.149^{ns}	-0.149^{ns}	0.486^{**}				
E	-0.352^{ns}	0.922^{**}	0.498^{**}	0.0566^{ns}	1		
F	-0.119^{ns}	0.416^{ns}	0.940^{**}	0.188**	0.500^{**}	1	
G	0.373^{ns}	0.192^{ns}	0.046^{**}	0.959^{**}	-0.055^{ns}	0.518^{**}	

(P=0.05)

Legend: As indicated in Table 1

Correlation coefficient (r) are in this order DXG (r=0.96) > CXF(r=0.94)> BXE (r=0.92)> FXG (r =0.52). EXF (r=0.50) > CXE (r=0.498) > BXC (r=0.492)> DXF (r=0.488)---------- > CXG (r=0.46).

Results have revealed through the relationship between CXF (r = 0.94) that Length by breadth of all leaves are related to the graph value (actual leaf area of all leaves). Correlation coefficient between C and F (r=0.94) further confirmed that measuring the length and breadth of lower, middle and uppermost leaf can accurately determine the actual area of all leaves through non-destructive means.

YEAR 2005 ANNUAL REPORT

FARMING SYSTEMS RESEARCH PROGRAMME (Leader: Dr. A.O. Olaiya)

Title:Determination of the optimum spacing and plant population of Kola and Citrus in Cocoa/Kola/Citrus Intercrop.

(Famaye, A.O; Adeyemi, E.A; Olaiya, A.O.' Hammed, L.A.; Oloyede, A.A. and Ayegboyin, K.O.)

Introduction: Polyculture is the normal cropping system among Nigerian farmers. Diagnostic survey revealed that farmers intercrop cocoa, kola, citrus along-side arables such as cereals, legumes and vegetables at the juvenile stage of plantation establishment. Farmers plant the two component crops (kola and citrus) in the mixture at close spacing leading to etiolation of cocoa and general poor performance of this popular cropping system. Consequently,the need to determine an optimum spacing of kola and citrus in the mixture necessitated this study initially at Ajassor, and is currently being replicated at the Institute's headquarters in Ibadan.

Objectives: (i) To determine optimum spacing of kola and citrus in cocoa/kola/citrus intercrop

(ii) To determine effect of the intercrop on nutrient dynamics of the soil.

(iii) To study effect of the cropping mixture on pest and diseases status of each of the component crops

Materials and Methods: The experimental treatments were laid out in a Randomized Complete Block Design (RCDB) on 1.32ha of land area as follows:

Kola and Citrus each spaced at :

(i) 24m x 24m to give 17 trees/ha of each

(ii) 24m x 12m " " 34 " " "

(iii) 21m x 10.5m " " 45 " " "

(iv) 12m x 12m " " 69 " " "

(v) 9m x 9m " " 123 " " "

(vi) 3m x 3m cocoa " 1,111 " " "

(vii) 7.5 x 7.5 kola to given 177 trees/ha

(viii) 7.5 x 7.5 citrus to given 177 " "

Intercropped cocoa was transplanted at 3m x 3m in all the treatments. Cocoa and Kola seedlings were obtained from CRIN headquarters while Citrus seedlings (Agege variety) were procured from NIHORT, Ibadan. Seedlings were transplanted between July and August, 2005.

Results and Discussions. The survival count of the seedlings is about 10% due to the prolonged dry season witnessed in the year. The absence of irrigation to augment the soil moisture compounded the problem. Labour also was inadequate at the time of establishment; causing delay in land clearing and subsequent cultural operations after establishment.

Summary and conclusion: The plot will be re-established in year 2006. Also it will be supplemented with irrigation.

Title: Effect of rehabilitation on the yield of Coffee in Coffee/Kola intercrop (Famaye, A.O.; Adeyemi, E.A., A.A. Oloyede and K.O.Ayegboyin)

Introduction: The coffee/kola intercrop plot, which was established over 70 years ago had become moribund and bushy. The plot was therefore rehabilitated in year 2001.

Objectives: To rejuvenate the moribund bushy plot
To increase productivity of the plot
To ease harvesting of coffee berry.

Materials and Methods: Two rehabilitation methods namely:

(i) Coppicing and chupon regeneration

(ii) Replanting through seedlings transplanting and

(iii) Control without coppicing

Thus giving three treatments laid out in Randomised Complete Block Design with three replicates the kola trees were coppiced at 30cm, 60cm and 120cm above ground level using chain saw. Coffee was coppiced at 30cm above ground level.Maize were planted in interrows of coppiced and replanted plots.

For the year under review harvests were obtained from coppiced and control plots of coffee.

Results and Discussion: Table 1 below shows mean yield of coffee berry

Table 1: Mean yield of coffee berry

Treatment	**Mean yield of coffee berry (kg)**
Uncoppiced plot (control)	239.20
Coppiced plot	565.07

Mean coffee berry yield was higher in coppiced than uncoppiced plot. This could be due to a better micro climatic condition obtained as a result of the coppiced overhead kola trees in the intercrop that did not allow about 50% light intensity required coffee and also the vigour of the newly regenerated coffee chupons thereby inducing better fruiting.

Coppiced Kola – Most of the stands continued to flower as reported in the previous year however we have not observed pod formation. It is hoped that fruiting will follow the flowering observed this year.

Summary and Conclusion

Better yield recorded in the coppiced plot of coffee has further confirmed coppicing to be a way out of rejuvenating old, moribund coffee groove.

Reference:

Famaye, A.O. (2000). Effect of shade regimes on growth and nutrient uptake of seedling and mature tree of coffee species in Nigeria. Ph.D Thesis University of Ibadan. 223 pp.

Title: Evaluation of Coffee/Oil palm intercrop

(Famaye, A.O; Oloyede, A.A. and Ayegboyin, K)

Introduction: As a result of dwindling price of coffee in the international market, it will be worthwhile to improve the lots at coffee farmers whose means of livelihood depends on the produce. Reconnaissance carried out on farmers plots had revealed combination of coffee with other crops (cash and food). In 1965, a similar experiment with cocoa was carried out at CRIN Headquarters and two substations with good results. Incidentally cocoa and coffee belong to the same family sterculaceae and had same spacing of 3.1 x 3.1 under monocropping. Its in the light of the above that this experiment was initiated to investigate hollow – square and avenue arrangements on the growth and berry yield of coffee.

Materials and Method

This experiment was sited in Zone 5 of Cocoa Research Institute of Nigeria, CRIN Headquarters, Ibadan, to investigate growth and yield of coffee under two intercropping arrangements with oilpalm. In the hollow square arrangement, a square of 9 oilpalm stands (3 by 3) planted at 9m x 9m spacing and have the middle stands omitted. The space created by omitting the middle stands of oilpalm was planted to coffee at 3m x 3m. For avenue, coffee was planted at 3m by 3m in between the two rows of oil palm. Plantain was used as a shade crop, which was planted at same spacing with the coffee. Data were taken on growth parameters of height, girth, number of leaves, leaf areas number of branches and canopy score on monthly interval.

Result and Discussion.

The results obtained so far in 2005 on growth parameters of coffee are presented in Table 1. In most of the parameters measured, significant differences exist with both avenue and hollow-square shown superior performances except in height and number of leaves where the control was better. This result is still at the preliminary stage. Further data shall be collected in the subsequent years to obtain a consistent result.

Table 1: Mean value on Coffee growth parameters 2005

Treatment	Plant Height	Plant Girth	LN	LA	NB	CA
C	90.9a	1.1a	25.7a	107.83a	6.4a	1354.5a
AV	72.3b	1.2a	31.6a	126.41b	5.1ab	1433.0b
HS	77.6b	1.3b	23.4b	118.0Ab	3.9b	1388.6ab
Means	80.3	1.2	26.9	117.41	5.13	1392.03
LSD(p=0.05)	4.38	0.16	6.33	13.97	1.88	59.12

Legend: C= Control, AV= Avenue arrangement, HS= Hollow squares arrangement,

LN = No of leaves,LA = Leaf Area, NB= Number of branches.and CA= Canopy Score

Title of Programme: Farming System Research (Programme Leader: Dr. A.O. Olaiya)

Experimental Title: Utilization of Cocoa, Cashew & Kola Plantations for honey Production (Project Leader: Dr. R. A. Hamzat)

Introduction: The greatest value of bee keeping is in the fact that bees pollinate agricultural and horticultural plants like cocoa, kola, coffee, cashew and tea etc. When a bee has found the flowers of a certain kind of plant, she will encourage her hivemates to use this source. In order to take advantage of this benefit in honeybees, there's need for CRIN to raise honeybees in her plantations. This project was presented and was approved by the management to take off.

Objectives:
1. To utilize the vast plantations of cocoa, kola, cashew and coffee in honey production.
2. To facilitate the pollination of CRIN's mandate crops by honey bees

Materials Methods: The CRIN's beehives have been located at different places under the plantations of cocoa, cashew and kola and three of the hives have been colonized by honeybees. However no experimentation has been commenced.

Constraints:
1. Lack of pick-up van to convey scientists and workers to the field
2. Lack of motorcycle for routine daily operations at the sites
3. In adequate quantities of beehives that can represent all the suitable sites on the CRIN estate.

Experimental title: On farm adaptive Research on Cocoa rehabilitation through coppicing, budding and grafting (Olaiya, A.O.)

Introduction: This project was initiated by FUTA with collaboration from CRIN and Ondo state ADP. It started in 2002 and the first phase ended in 2005. The project was funded by CIRAD with the West Africa technical co-ordinator from France and the Secretariat in Ghana.

Objective: The project is farmers participatory approach to evaluate various rehabilitation options with a view to recommend appropriate techniques to farmers in three ecological zones in Nigeria.

Materials and Methods: Several farms were visited in Ondo, Osun and Cross River states to do the socio-economic survey farms in Ondo state for its experimentation. Nine rehabilitation options evaluated are coppicing and chupon regeneration, coppicing and budding of CFC material C77 on the regenerated chupon,, coppicing and budding of CFC material Pa x Pa 150 on the regenerated chupon, coppicing and grafting of C77 on the regenerated chupon, copping and grafting of P1 x Pa 150 on the regenerated chupon, coppicing and budding of selected super tree material in farmers farm on regenerated chupon, coppicing and grafting of super tree on regenerated chupon, cutting out of mother tree and allow volunteer basal chupon to replace it and cutting out the mother tree and replanting with improved seedlings from CRIN.

Results: The result of the experiment is being compiled and a copy shall be sent to CRIN after ratification from the donor agency

Farming System Research Programme(Leader: O.A. Olaiya (Ph.D)

Experimental title: Intercropping *Coffea canephora* pierre ex Froehner with food crops at early establishment stage in Nigeria. (Oloyede, A.A. and Famaye, A.O.)

Introduction: Occupying the inter-rows of coffee with food crops when the trees are young is a common practice in Africa (Rene, 1991). A trial involving growing of traditional food crop with *C. canephora* in Cote d 'Voire was successful (Rene, 1991). It is in the light of the above that experiment was initiated in 2001 to see how well coffea performed when intercropped with food crops.

Objective: To evaluate the effect of intercropping food crops with coffee at early establishment stage.

Materials and Methods: The following crop combinations were evaluated on the growth and berry yield of coffee at early establishment stage in 2001.

(1) Coffee/sweet potato/maize
(2) Coffee/cassava/maize
(3) Coffee/cassava
(4) Coffee/Cocoyam/Okra/Pepper
(5) Coffee sole

The treatments were laid out in randomized complete block design (RCBD) with three replicate. Data were collected on vegetative parameters of height, girth, number of leaves, Leaf area and number of branches. LSD was used to separate the means that were significant.

Table 1: Mean growth parameters of coffee in for 2002 and 2003

	2002					2003				
Treatment	**Ht(cm)**	**Gt(cm)**	**NL**	**LA(cm2)**	**Br**	**Ht**	**Gt**	**NL**	**LA**	**Br**
C/sp/m	84.2	1.3	78	58.8	11.9	62.2	2.0	263	98.4	42.2
C/ca/m	73.1	1.1	47	55.23	6.7	81.3	2.4	174.4	129.71	28.2
C/ca	76.4	1.1	46	54.43	9.5	45.0	1.5	101.3	78.84	14.3
	83,8	1.2	114	69.63	14.4	116.8	2.5	301.8	134.90	47.8
C	69.9	1.2	68	48.13	9.0	69.5	1.8	137.0	100.42	27.2
Mean	77.48	1.2	70.6	57.24	10.3	74.96	2.04	195.9	108.45	31.94
SD	5,71	0.8	24.93	7.80	2.63	24.00	0.37	75.52	20.95	11.87
LSD	6,55	0.09	28.61	8.13	3.02	27.55	0.43	86.68	24.04	13.62

	Yield(kg/ha)	
Treatment	2004	2005
C/sp/m	60.5	257.5
C/ca/m	64.0	280.0
C/ca	63.4	267.5
C/cy/ok/pp	70.3	315.0
C	64.8	302.5
Mean	64.6	284.4
SD	3.20	21.33
LSD	3.67	24.48

Table 2: Mean berry yield of coffee (kg/ha) in 2004 and 2005

Results and Discussion: Table 1 shows the growth performance of coffee under various combinations. In most of the parameters measured coffee under cocoyam/okra/pepper performed better than other treatments including the sole coffee (control). The reduction in some values obtained in 2003 as against higher values in 2002 was as a result of drought experienced in the previous season. It was at the onset of rains that some of the stands started to shoot back. Yield of berries as recorded in Table 2 showed that they follow milar pattern as obtained in Table 1. The results obtained from this study have shown that coffee can be suitably grown with food crops particularly cocoyam/okra/pepper at early establishment stage usually between 1-3 years hazardous without any effect. This study was in agreement of earlier coffee berry yield is expected to stabilize at a higher value in the coming season (2006) with a value of more than 1000kg/ha.

Reference:

Rene Coste (1991): Coffee. The plant and the product Macmillan Press Ltd. Pp 328.

2004/2005 ANNUAL REPORT
BIOTECHNOLOGY PROGRAMME
LEADER (DR. L. N. DONGO)

Experimental Title: *In vitro* response of cocoa (*Theobroma cacao* L.) floral bud explants in somatic embryogenesis. (Muyiwa A. A.)

Introduction: More recently, efforts had been made to induce somatic embryos from floral and nucellar somatic tissues (Fuguiera and Janick, 1993). Although progress has been made in this area, efficiencies of somatic embryogenesis capable of propagating a wide variety of cocoa genotypes with high efficiency using floral explants was reported by li et al (1998) to this end commonly used cocoa breeding clones of CRIN were subjected to somatic embryogenesis and plantlet regeneration using staminodes explants and following the standard protocol developed by one Penn-State University U.S.A responses of this breeding clones to culture conditions are presented here.

Objectives: To induce somatic embryos and to regenerate plantlets for micro propagation of commonly used cocoa breeding clones.

Results and Discussion: The result of this experiment is as follows: callus formation were observed on all the clones cultured, Calli induction on clones T86/45 and T85/799 were 100%. Clones. T87/799 and T79/379 grew poorly, while Sca 12 op and T12/1223 failed to grow. Somatic embryos through direct organogenesis was observed on clones T86/ 45 which is similar to the work of Li *et al*. (1998). Preembryonpensorsic protuberances emerged from the explants surface with suspensors attached in clusters and gradually developed into heart shaped embryo, Pinkish in colour that later turned to have an enlongated hypocotyls and leaf like structures.

In Vitro morphogenic responses observed using staminodes explants

CLONES	***OBSERVATION***	***%RESPONSIVE***	***SOMATIC EMBRYOS***
T86/45	Compact Callus, Adventitious roots Torpedo shaped Embryogenic	100	3
T85/799	Friable Callus Adventitious roots	100	0
T12/1223	No morphogenic response	0	0
T87/79	Friable Callus	10	0
Sca 12 o.p	No morphogenic response	0	0

CONCLUSION
This report is an indication that somatic embryos can readily be developed from staminodes explants and when placed in the right medium can provide plantlets.

2005 ANNUAL REPORT
Programme CPU

Title: Production and Nutrient Composition of Cashew nut Butter
Authors: Ogunwolu, S.O. and Ogunjobi,M.A.K.
Introduction: Cashew fruit is made up of apple that bears the fruit in which the kernel is embedded. The real fruit of the cashew is the nut. The nut is composed of kernel and pericarp or shell. The kernel represents 20-25% of the nut's weight. Cashew kernel is of high food value and an important delicacy, which is mainly used in confectionery and as desert nut.
In view of increasing production of cashew globally, there is need for increased utilization of cashew nut, especially the nutritious cashew kernel.
Objective: The objective of this work is to produce and determine the nutrient composition of cashew nut butter.
Materials and Method: Cashew nuts were obtained from Cocoa Research institute of Nigeria, Ibadan. The dried raw wholesome nuts were steamed at 121^{o}C, 5lb pressure for 5mins, allowed to cool and cut into two equal halves using manually operated cashew nut sheller. The kernels were then separated from the shells using small knives. The kernels were dried in Cabinet Gallenkamp Oven at 60^{o}C for 48hours to reduce the moisture content to 5-6%(D.B). The testa surrounding the kernels was removed by hands. The kernel was ground into very fine paste; other ingredients like salt, Emulsifier and Preservative were added and homogenously mixed with the cashew nut paste to produce cashew nut butter. The butter was then packaged into opaque small plastic containers and stored at room temperature (about 27^{o}C).
Sensory Evaluation was carried out on the cashew nut butter, using commercial peanut butter as the standard. The chemical composition of the cashew nut butter and peanut butter were carried out using the method of AOAC (1990).
The cashew nut butter is still under storage-study to determine the shelf life at different storage conditions.
Result and Discussion: The chemical composition of the cashew nut butter was favourably compared with that of commercial peanut butter as shown in Table 1. The Ash content, carbohydrate and some minerals (Magnesium, Phosphorous and Potassium) were significantly higher in cashew nut bitter than peanut butter. While there was no significant difference between the protein and fat contents of the two butter.
The sensory evaluation result showed no significant difference on the acceptability of the cashew nut and peanut butter

Table 1: Chemical Compositions of Cashew nut and Peanut butter

Parameters	**Cashew nut butter**	**Peanut butter**
Moisture(%)	1.50 ^{a}	1.12 ^{a}
Crude protein(%)	21.52 ^{a}	22.10 ^{a}
Fat%	51.92 ^{a}	52.70^{a}
Ash%	3.20^{a}	3.00^{a}
Carbohydrate(%)	20.80^{a}	13.10^{b}
Minerals:		
Calcium(mg/100g)	36.00 ^{a}	37.10 ^{a}
Magnesium(mg/100g)	250.00^{a}	180.00^{b}
Sodium(mg/100g)	290.00^{b}	350.00^{a}
Potassium(mg/100g)	730.00^{a}	700.00^{b}

a,b means in the same row with the same letter are not significantly different (P<0.05).
Conclusion: It could be concluded that cashew nut butter is a nutritious food and the production of cashew nut butter will increase the food utilization of cashew nut.

ANNUAL REPORT

Tittle: Effect of Boiling Time on The utilization of Cocoa bean Shell in Laying Hen Feeds

O.Olubamiwa. B.A Adebowale and R.A. Hamzat

Introduction: Efficient utilization of cocoa by products has been identified as one of the means of ensuring the sustainability of the cocoa economy. A series of studies was started in 2000 with the aim of finding commercial usage for cocoa bean shell (CBS) in poultry (layer) diets.

Cocoa bean shell is a waste production from chocolate and cocoa milling industries. Tones of it goes to waste annually in the animal production sector are majorly is low crude protein level and the presence of an antinutritional compound called theobromine which is injurious to animal at above 0.0279kg/body weight (Menon,1982). However, theobromine compound can be reduced by heat, sun drying and boiling (Menon, 1982).

Objectives (1) to increase the percentage CBS/Maize replacement in layers mash without any adverse effect on birds performance. (2) To determine the optimal boiling time for CBS detheobromising attempt.

Methodology: Seven feed treatments were used for the experiment. Diet A (0% CBS), B (20% untreated CBS), Diets C,D, E and F contained 15,30,45, 60 minutes boiled CBS at 20% maize replacement. While diet G is a commercial diet (HOPE feeds) Table 1.

A total of one hundred and sixty-eight, 32weeks old layers were randomly distributed into seven feed treatments. Each treatment had three replicates, with eight birds per replicates. The experiment was completely randomized and lasted for 10 weeks. Feed and water were give ad-libitum. Eggs laid by each bird in each replicate were collected and recorded. Weekly records were taken there from. Parameter like egg production, Egg weight, Feed conversion ratio and Feed cost/kg Egg treatment were also taken.

Result: Egg production, egg weight and feed conversion were significantly ($P<0.05$) better on the control and 15minutes diets feed cost/kg egg was least on the 15-minutes diets. Feed intake and egg quality parameters were similar on the various feeds.

Consequently, the results of this experiment show very convincingly that the 15minutes boiling duration is the best for optimal and profitable utilization of CBS in layers mash.

Title of Programe: Crop Processing and Utilization

Title : production and Evaluation of Soy-Chocolate beverage Drink (Jayeola C.O)

Introduction: soy-chocolate, which is a protein beverage drink, is an ageous extract of Soya beans and cocoa. Over the past decade, soymilk and cocoa processing and usage have received unprecedented acceptability in Nigeria. Thus this research work is a new technology that incorporate cocoa powder into soy milk processing to boos its nutritional value resulting to a product knows as soy-choco.

Objectives: 1). To combat malnutrition in our society

2). To encourage incorporation of cocoa into our traditional food.

Materials and Methods: The product formulation was in two ways. The first method involved the grinding of roasted cocoa nibs with blenched soyabeans and the second method involved mixing of the cocoa powder with blenched and ground soyabean. The blends for the two methods remain the same with 5, 10,15, and 20% cocoa nibs or powder addition. The mixture was diluted with 3parts of water and sieved. The aqueous solution obtained was boiled and sweetened. The products so produced were subjected to proximate analysis. The sensory evaluations carried out on the product were assessed for colour, taste, flovor and overall acceptability.

Result and Discussion: All the products showed a significant increase in the protein content which ranges from 20.2 to 28.4%. The result of the sensory analysis showed no significant different at 5% probability level except for colour and flavour. The overall acceptability revealed that the products were acceptable.

This experiment indicated that cocoa could be utilized maximally for this novel product.

Table 1: Means Sensory Score for Soy-Choco Beverage

Cocoa inclusion	Colour	Taste	Flavour	Overal Acceptability
A (5% cocoa inclusion)	6.2[b]	6.0[b]	7.6[a]	7.4
B(10% "	6.4a	6.2[b]	7.8[a]	7.8[a]
C (15% "	7.2[a]	7.2[a]	7.8[a]	7.8[a]
D(20% "	7.4[a]	7.6[a]	7.8[a]	8.0[a]

Title of Programe: Crop Processing and Utilization

Experimental Title: Production and Quality Assessment of Maltitil-Sweetened Chocolate(Ogunjobi M.A.K and Ogunwolu, S.O)

Introduction: The Primary sweetener in chocolate and its products has been sucrose for several years. However, sugar-free chocolate is one of the most recent and rapidly growing areas in the market place (Anderson, 1999). Maltitol is a reduced calorie bulk sweetener with sugar-like taste ad sweetness.

Objectives: 1) To replace sucrose with maltitol in the chocolate recipe
2) To determine the physico-chemical and sensory quality properties of maltitol-sweetened chocolate

Materials and Methods: The modified method for standard milk chocolate processing adopted by CRIN was employed in the production of the matitol sweetened chocolate as well as the control samples. Maltitol was substituted at 50%,75% and 100% respectively while the control was 100% sucrose.

Nutrient Composition, melting characteristics and sensory evaluation were determined for all the chocolate samples using appropriate analysis procedures.

Result and Discussion: The results of the experiments showed that the maltitol-sweetened chocolate has lowere calorie value as shown in table below.

Table 1: Proximate composition of Maltitol-sweetened and Sucrose-sweeteed chocolates.

Samples	50%Maltitol-Sweetened	75%Maltitol-Sweetened	100%Maltitol Sweetened	100%Sucrose Sweetened
Moisture%	1.02[b]	1.06[b]	1.02[b]	1.66[a]
Ash%	1.77[b]	1.76[b]	1.78[b]	2.42[a]
Fat%	28.60[a] 28.58[a]	28.62[a]	29.42[a]	
Protein%	5.26a	5.32[a]	5.45[a]	5.12[a]
Carbohydrate% 40.68[b]	40.73[b]	40.84[b]	52.86[a]	
Calories	247.00[b]	246.74[b]	248.13[b]	507.66[a]

Table 2: Sensory Evaluation of Maltitol-Sweetened and Sucrose-sweetened Chocolate

Samples	50%Maltitol-Sweetened	75%Maltitol-Sweetened	100%Maltitol Sweetened	100%Sucrose Sweetened
Colour	6.92[a]	7.24[a]	7.35[a]	7.23[a]
Taste	5.31[b]	6.72[a]	7.03a	6.84[a]
Sweetness	5.12[b]	6.64[a]	7.16[a]	6.88[a]
Texture 6.84[a]	6.91[a]	6.80[a]	6.72[a]	
Overall acceptability	5.72[b]	7.54[a]	7.50[a]	7.34[a]

a,b Mean values in the same row with similar letter(s) are not significantly different at 5%level ($P<0.05$)

Conclusion: Maltitol-sweetened chocolate compared favourity with sucrose-sweetened chocolate It's lower calorie value is an advantage which makes it suitable for diabetic people to consume.

Title: Biochemical Spectrin of Tropical Cashew apple (Aroyeun, S.O.)

Introduction: The biochemical composition of cashew apple is the resuslt of variety and cultivar. Most biochemical analysis carried out on the cashew apples have been carried out using some characteristics like shape and size but less emphasis on colour as cashew is known to have both red and yellow varieties (Falade,1981, Akinwale ,2000, Aroyeun 2004).

Objectives: Determine the effect of cashew apple colour on its biochemical characteristics

Materials and Methods: 540 cashew apples were plucked from the cashew apple plantation of the Cocoa Research Institute of Nigeria, Ibadan experimental plots. 60 apples were plucked from each of the cashew apple zones and the total of 9 cashew apple zones were used in this study. 180 red apples were obtained from 3zones while 360 were obtained from yellow cashew apple zones. The zones were labeled 1,2,3,4,5,6,7,8,9 with the numbers representing the zones from where the cashew apple yellow and red varieties have been plucked. (Data not shown). The apples were plucked at optimum ripening stages. Due to the photosensitivity of cashew apple vitamin c, the apple juices were processed without delay under subdued light. Fruit samples were extracted using a juice extracted using a juice extractor (Philips model) and the juice obtained from each sample was sieved using muslin cloth.

Chemical analysis: Ascorbic acid (AA), cloud loss(cl), Juice yield(JY), Viscosity(Vis), PH, specific Gravity, maturity index (MI), total soluble solid)TSS), Titrable acidity (TTA), according to method of AOAC, 2000.

Summary and Conclusion: significant differences ($P<0.05$) were found in vitamin C both between varieties and for each zone between yellow and red varieties. The correlation matrix (Table1) indicated that there was positive correlation between pH and MI. A significantly positive correlation was found between the TSS and pH. The higher the TSS, the higher the pH. Significantly negative correlation existed between MI and TTA.

Result and Discussion:

Table 1 Correlation matrix of the biochemical profile of cashew apples

	pH	SG	TSS	TTA	JY	Vis	vit.C
PH							
SG	.333						
TSS	-.913^{xx}	589					
TTA	-.938^{xx}	-.552	-.992^{xx}				
JY	.399	-.351	.247	-.333			
MI	.946^{xx}	.534	.995^{xx}	-.996^{xx}	.302		
Vis	-.107	.368	.007	.007	-.628		
Vit.C	.005	.089	.018	-.108	-.452	.719	

References:
1. Aroyeun,S.O.(2004) Nutrition and Food Science Vol.34(1)
2. Akinwale,T.O.(2000) Eur.Fd. Res. Technol. –211)3):205-207
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Programe: Crop Processing and Utilization

Title: Microbes Involved in the determination of Cashew nut kernel under different storage conditions. By Igbinadolor, R.O.

Introduction: World wide, cashew nuts are highly esteemed and priced food delicacy because of their pleasant taste and flavour. This growing interest has been ascribed to the purported dual roles of the kernel. It can be used as a substitute for peanut in the confectionery industries and as an important source of lipid and protein.

Unfortunately, during processing, cashew nut kernel being highly hygrosopic is very susceptible to microbial determination and spoilage when not properly stored. Being an oily seed has been highly implicated in human and animal pathology due to mycotoxin formation (Bacha et al,1988).

Objectives:

(1) To accept the interesting effect of water activity, moisture content and time on the storage stability of cashew kernel and identifying the organisms involved.
(2) To determine the best suitable storage conditions so as to minimize the formation of toxins, which can endanger consumers' health.

Materials and Methods: Good grade cashew nut of the current season was obtained from the store unit of CRIN, the kernel isolated using a simple cutter knife roasted and then subjected to different relative humidity of storage.

Results and Discussion: Eight fungal isolates were obtained from the various treatments and were identified as A. niger, A. flavus, penicillium sp, Botrydiphlodia sp, Rhizopus sp, Fusanium Compactum, Trichodermus sp and A. ochraceous while the bacterial isolates were identifies as bacillus subtilis, B. lichemiformis and staphylococcus sp. Respectively and there number were relatively low.

Table 1: Frequency of Occurrence of different fungal isolates

Fungi Isolates		Frequency of Occurrence(%)
Rhizopus		34.9
A. niger	32.6	
Penisillium sp		11.6
A flavus	4.6	
Trichoderma sp	7.0	
Fusanum Compactum		4.6
A. Ochraceous		2.3
Botryodiplodia sp		2.3

The most frequently encountered fungi specie with the higher frequency as seen from the table were Rhizopus sp an A. niger, there mould are highly lipolytic and they develop quickly under high humid conditions. While that of the bacterial many also be due to their lipolytic effect and being able to produce spores, which can resist heat of moisten of the kernel.

The pH values that were obtained shows that at a high relative humidity, the value decreases and this was responsible for the high growth of fungal isolates, similar observation was done by smith and moss (1985).

Summary and Conclusion: Thus far, the overall findings shows that cashew nut kernel is highly hydroscopic and therefore the need for proper storage and close monitoring of the microbiological quality in order to protect public health and this can only be achieved by the modified atmospheric storage used.

PROGRAMME: Crop Processing and Utilization

Title: Effects of pH and particular size on the sorption of heavy metal ions by Cocoa Pod Husk.

Introduction: Many studies have been carried out on the sorption pattern of heavy metal ions by cellulosic material. This includes maize cob, melon seed shaft and recently cocoa pod husk (Okieiman eta al 1989, Babarinde, 2002 and Yahaya et al 2003). These materials have proved to be good adsorbents.

Objectives: To further enhance the sorptive ability of cocoa pod husk, there becomes the need to investigate the effects of pH and particle size on adsorption.

Materials and Method: Equilibrium sorption process was employed to determine the effects of pH and particle size (Yahaya et al 2003).

Result and Discussion: From the results shown in table1 & 2, it is very clear that sorption behaviour is dependent on decreasing particle size.

Table 1: Amount of metal ion sorbed for Pb(ii) ion for different particle size.

Initial concentration (PPm)	Particule size(mm)			
	0.5	1.0	1.5	2.0
500	249.5	242	236	229
400	191.6	187.6	174.8	153.6
300	140.9	139.5	135.9	126.6
200	92	85	72	71.8
100	43.8	40.5	38.4	35.1

Table 2: Amount of metal ion sorbed (PPm) for cd(ii) for different particle size

Initial concentration (PPm)	Particle size(mm)			
	0.5	1.0	1.5	2.0
500	248.3	245.5	241.5	236
400	192.4	190.8	176.4	173.6
300	141.0	139.2	133	131.2
200	91.4	86.4	86	78.8
100	42.6	40.1	37.5	35

from the pH study, it was observed that both metal ion sorbed best at pH that tends toward neutral ie. Between 8-10.

Conclusion and Summary: From the study, it is evident that cocoa pod husk at lower particle size and neutral pH, adsorption seems to be best.

ANNUAL REPORT OF STATISTICS, SOCIO-ECONOMICS, AND TECHNO- ECONOMICS PROGRAMME FOR YEAR 2005

Project Title 1: Labour Cost Variation in the Processing of Cocoa in Ondo State

1. Introduction

Processing of cocoa is considered to be one of the most important post-harvest practices of cocoa as it goes a long way in determining the quality of the beans as well as the eventual market value and hence the returns which will accrue to the producer (Ojo, 2005)
Some of the activities in the processing of cocoa commences with the breaking of pods, the fermenting, drying and finally its bagging in preparation for the market. More often than not farmers are forced to focus a lot of labour both family and hired labour towards this end and hence use as much labour as they can afford considering their level of productivity as reported by Debenham (1999) , Gocowski and Oduwole (2003).

As a result of such a high premium that is expected on the quality of cocoa it is of interest to know if the labour force used in the processing of cocoa is justified in terms of production output.

2. Specific objectives

1. To determine the variability of labour use in terms of processing activities.
2. To determine the cost of labour use for processing activities.
3. To compare cost of labour use in processing across different Local Government Areas (LGA's)
4. To ascertain relationship between processing cost and farmers production output

3. Methodology

The study as carried out in 2005 in Ondo State which is the largest producer of cocoa in Nigeria with an estimated ouput of 80,000 tonnes/year. Four cocoa producing LGA's were selected for the study and 120 farmers were randomly selected using the LGA's farmers list. Structured questionnaires were used to solicit information from farmers.

4. Results and Discussion:

The farmers in the study had various types of land ownership pattern. Twenty five percent of them were sharecroppers, 40 % of farmers inherited their land, while 24 % rented theirs. In addition 31 % of the farmers purchased their land. Table 1 shows the distribution of the farmers based on the labour force used in the processing activities of cocoa. It was observed that a majority of 40% of the farmers use between 6-10 people in processing while 0-5 and 16-20 people class was 10 % respectively.

Table 1: Number of People Processing By Size Class

Size Class of Number of people Processing	**Percentage (%)**
0-5	10
6-10	40
11-15	24
16-20	10
> 20	16

Source: Field Survey 2005

Analysis of variance result in table 2 showed that the number of labour force used in the different class of processing activities was significant at $P < 0.05$. The same can be said of the cost of all processing activities. Cost of Pod breaking was highly significant, so also fermenting, sun-drying, bagging and total processing cost ($P < 0.05$). The overall mean of processing cost is N10,548/farmer/year.

Further analysis of correlation results however showed that no strong correlation existed between the number of people processing and the output of farmers ($r = 0.041$) this suggests that farmers use of labour is not solely determined by ouput. Equally the correlation result of

family labour used as against hired labour was r = 0.005 which suggest that a very weak association existed, experience on the field shwed that if more hired labour was used the less the dependence on family labour. However, correlation result of number of people processing and the cost of processing was high (r = 0.744) which holds true as more cost will be incurred as more labour is hired.

It is of interest to note that the ANOVA results showed that the Overall mean of the various class of processing was 1.15 tonnes/year with P > 0.05, hence the output from various classes is not significantly different. T-test result was highly significant (t < 0.05) in comparing the mean of family labour used against hired labour for processing.

Table 2:Mean Variation of Processing Cost Activities in Different Labour Size Class

Variable	< 5	6-10	11-15	16-20	> 20	Overall Mean	Variance	P
People Processing	2.5	8.04	13.14	18.14	29.44	13.07	86.78	<0.05 *
Cost Bagging + weighing	650	406	525	450	1878	684	5.23	<0.05 *
Cost Pod Breaking	467	1254	1604	3443	6711	2331	6.77	<0.05 *
Cost Sun-drying	2867	3300	4236	5921	7867	4466	6.77	<0.05 *
Cost Fermenting	1450	2148	2486	3514	7156	3068	4.38	<0.05 *
Cost Processing	5433	7108	8850	13329	23611	10548	17.43	<0.05 *

Source: Field Survey, 2005
Significant = *

A cross examination of the cost of various processing activities across different LGA's revealed the result in table 3. Results show that the overall out put was not significantly different (P > 0.05), the same can be said of the various cost of processing activities. Hence results show that cost of processing activities as one moves from one LGA to another in the study area is not significantly different.

Table 3 : Mean Variation of Processing Cost Activities across Different LGA's

Variable	Idanre	Old Ondo East	Ondo East	Owena	Overall Mean	Variance	P
People Processing	13.3	9.2	16	15.3	13.1	0.41	0.802 NS
Cost Bagging + weighing	632	270	620	700	684	4.18	0.45 NS
Cost Pod Breaking	2361	820	6300	1700	2331	1.27	0.294 NS
Cost Sun-drying	4078	5600	5350	6950	4466	1.22	0.312 NS
Cost Fermenting	2847	3660	4950	4425	3068	0.37	0.827 NS
Cost Processing	9919	10410	19725	13775	10548	0.91	0.466 NS
Output	1.02	2.0	2.00	2.00	1.19	1.15	0.727 NS

Source : Field Survey, 2005.
NS = Not Significant.

5. Conclusion and Recommendation

Results from the study showed that farmers output was not significantly different across the different class size in labour force used in processing ($P > 0.05$), equally the production output across the different LGA's was also not significant ($P > 0.05$). However, cost incurred for various farm activities was highly significant for various processing activities across different class size of labour ($P < 0.05$). Such findings brings to mind the fact that farmers use the same labour force for different farming activities which may involve tree and food crops and not necessarily restriction to only cocoa farming.

Most cocoa farmers have diversified farms where farming systems include cocoa production along with other tree and food crops to ensure food security, diversified incomes, prevent total crop failure as well as preventing fluctuations in price due to market forces.

Though the study shows that cost of processing is not correlated to output this does not necessarily imply that farmers are poor managers of resources. On the contrary it reveals that there is a need of further study to ascertain spread of labour expenses over the entire farming activities that generate income and also if such labour use reflect positively on the quality of cocoa beans. In essence it is not unlikely that farmers being rational decision makers maximize their resource availability efficiently.

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Project Title 2: Transportation Methods of Cocoa Farmers in Ondo State

1. Introduction

Methods of transport used by farmers on the field play a very important role in the timeliness of various farm operations on the farms. Types of transport used often depend on a number of factors such as financial strength of farmer, availability of credit facilities, good access roads, and the distance from farm to places where other farm operations have to be undertaken.

Types of transport used by farmers often are very simple and are locally suited for their various farming operations. Such methods of transport include, motorcycle, bicycle, wheelbarrows, vehicles and hand drawn trolleys.

2. Specific Objectives.

1. To determine the various methods of transportation and the cost implications of their use by farmers.
2. To compare the cost implications of various transport use across different Local Government Areas (LGA's)
3. To ascertain relationship of means of different transportation methods and farmers production output.

3. Methodology.

The study was carried out in Ondo state the largest producer of cocoa in Nigeria. Ondo state is located in the southwest Nigeria with predominant tropical rainforest vegetation. A sample of 120 farmers was selected through a systematic random sampling technique from 4 selected LGA's.

4. Results and Discussion

The study showed that farmers use of transport varied from bicycle, motorcycle, wheel barrow and vehicles. The types of transportation used were ranked based on the frequency score and the result is recorded in table 1.

Table 1. Rank of Transport Used By Farmers

Type of transport	**Rank**
Bicycle	1
Motorcycle	2
Wheelbarrow	3
Vehicle	4

Source: Field Survey, 2005

Table 2: Means of Distance and Cost of Different Types of Transport Methods Used by Farmers

Variable	Idanre	Old Ondo East	Ondo East	Owena	Overall Mean	variance	P
Distance to Farm (Km)	2.56	4.0	5.24	3.21	2.89	1.82	0.136
Distance wheel Barrow(km)	2.09	5.33	8.05	0.83	2.48	6.58	0.004*
Output Wheel Barrow(ton)	1.06	3.00	2.0	0.27	1.20	6.3	0.005*
Cost Distance Wheel Barrow(N)	501	283	250	0.5	440	1.08	0.389 NS
Output motorcycle(ton)	1.52	2.5	1.61	1.52	1.61	0.57	0.574 NS
Distance motorcycle (Km)	2.94	4.50	2.95	1.03	2.95	1.82	0.183 NS
Cost Distance motorcycle(N)	641	238	596	509	596	0.51	0.64 NS
Distance bicycle (N)	2.53	4.5	8.04	2.0	2.84	4.28	0.013*
Output Bicycle(ton)	1.7	2.53	2.0	1.32	1.75	0.36	0.785 NS
Cost Distance Bicycle (N)	391	662	252	351	407	0.48	0.696 NS
Distance vehicle(Km)	2.52	2.52	2.42	2.52	2.52	0.03	0.86 NS
Output Vehicle(ton)	1.065	1.103	2.0	1.103	1.103	86.31	0.001*
Cost Distance vehicle (N)	1010	985	400	985	985	0.93	0.366 NS

Source : Field Survey, 2005.
* = Signifcant at P< 0.05
NS = Not significant

The mean distance (Km) covered by the different LGA's ranged from 3.21km to 5.24Km while the overall mean was 2.89Km. However Analysis of variance (ANOVA) results revealed that the distance covered to farm across the different LGA's was not significantly different(Variance = 1.82, P> 0.05).

The output and distance covered by farmers that used wheel barrows was significant (P< 0.05), while the distance covered by bicycle was significant though the output was not significant .The results suggests that the distance and output varied significantly across the LGA's with the other means of transport such as motorcycle and vehicles in respect of distance covered was not significant while the output of vehicle users was significant. Wheel barrows are convenient means of transport especially when distance and relatively large output are to be ferried to convenient places for fermentation and its simplicity of use.

The output ferried by vehicle users was highly significant (P <0.05) though the distance covered was not significant (P> 0.05). Such results affirm the usefulness of Vehicles in transporting fairly large volume of output.

The cost of various farm transport was not significant,(ANOVA results, Table 2) for all the various methods of transportation. Correlation matrix showed that output and transport cost was negatively correlated (r = -0.166) while distance covered and the transport cost was also negatively correlated (r = -0.051)

5. Conclusion and Recommendation

Results of the study showed that bicycle was the most frequently used means of transport. The strong points of a wheel barrow and bicycle as a means of transport is that it is one of the easiest means of transport to maintain as the farmer does not have to incur recurrent expenditure such as fueling. In addition, bicycles can cover relatively long distance though time considerations have to be given in such respect. However, bicycles have a deficiency in that they have a small carriage capacity as compared to vehicles.

On the contrary however, cost covered for different LGA's with different methods of transportation was not significant which is an indication that relative cost of transportation is fairly the same for all LGA's under consideration. Wheel barrow transport showed significance to output and distance covered.

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Project 3: Analysis of Demand for Cottage Industry Cocoa Powder Based Beverages

R. A. Sanusi

Introduction: Cocoa is consumed mainly in form of beverages in Nigeria. Multinational companies produced cocoa beverages (herein referred to as LECB) at relatively high cost making them less affordable to an average household. Recently, small and medium scale enterprises (SMEs) are involved in the production of beverages at relatively low cost and the general decline in living standard had shifted demand to their product. In this study, a comparative analysis of the demand for small and medium scale firms' cocoa beverages (SMECB) and other beverage types in urban areas of South and North-central Nigeria was carried out.

Methodology: A random sampling technique was adopted in data collection from nine states in South and North-central Nigeria. These are Abia, Edo, Kaduna, Kwara, Lagos, Niger, Ondo, Osun, and Oyo States from which twenty urban local government areas (LGAs) were randomly selected and one hundred households were randomly sampled from each LGA. A total of 2,000 households were sampled. However, 1,413 questionnaires were used for the analysis. Information sourced with the aid of structured questionnaire included household size, age and gender of household head, prices and quantities

of SMECB and SMECB related commodities, as well as SMECB attributes. Data were analysed using descriptive statistics.

Results: A larger proportion of both SMECB consumers and non-consumers (55.8% and 53.8% respectively) believed that SMECB is comparable to any other cocoa beverage (Table 1). However, ironically, more SMECB consumers (31.2%) than non-consumers (11.5%) believed SMECB to be inferior to other cocoa beverages (Table 1) while the reverse was the case for those who believed that SMECB is superior to any other cocoa beverage (Table 1).

Table 1: Rating of SMECB to Other Beverages

Rating	***Consumers***		***Non-consumers***	
	Frequency	***Percent***	***Frequency***	***Percent***
Superior	52	7.1	7	1.0
Neither inferior nor Superior	410	55.8	365	53.8
Inferior	229	31.2	78	11.5
Undecided	43	5.9	229	33.7
Total	***734***	***100***	***679***	***100***

Source: Field Survey, 2003

The rating of cocoa beverage, coffee beverage (CBV) and tea beverage (TBV) were positively skewed with the skewness for cocoa been the highest followed by tea and then coffee by SMECB consumers and non-consumers (Table 2 and Table 3). The same pattern is observable in kurtosis statistics (Table 2 and Table 3).

Table 2: Statistics on Demand for Beverages by SMECB CONSUMERS

Statistics	***Cocoa beverage ranking***	***Coffee beverage ranking***	***Tea beverage ranking***	***Rating of SMECB to other beverages***
Skewness	1.78	1.31	1.51	0.41
Std. Error of Skewness	0.09	0.09	0.09	0.09
Kurtosis	1.77	0.61	1.00	0.06
Std. Error of Kurtosis	0.18	0.18	0.18	0.18

Source: Field Survey, 2003.

Table 3: Statistics on Demand for Beverages by SMECB NON-CONSUMERS

Statistics	***Cocoa beverage ranking***	***Coffee beverage ranking***	***Tea beverage ranking***	***Rating of SMECB to other beverages***
Skewness	2.32	1.50	1.80	0.38
Std. Error of Skewness	0.09	0.09	0.09	0.09
Kurtosis	4.36	1.24	2.41	-1.61
Std. Error of Kurtosis	0.19	0.19	0.19	0.19

Source: Field Survey, 2003.

In terms of brands, cocoa beverages (SMECB and LECB) had the highest average number of brands (2.03 and 1.74 respectively) demanded by SMECB consumers and (1.25 for LCB only) by SMECB non-consumers (Table 4 and Table 5). However, for both categories, tea had the highest average brands demanded than coffee. This is not unexpected since tea had more brands in the market than coffee.

Table 4: Statistics on Demand for Beverages by SMECB Consumers

Statistics	***SMECB Brands***	**LCB Brands**	***Coffee Beverage Brands***	***Tea Beverage Brands***
Mean	2.03	1.74	0.36	0.61
Std. Deviation	1.59	1.06	0.49	0.70
Skewness	2.20	1.44	0.73	0.93
Std. Error of Skewness	0.09	0.11	0.11	0.11
Kurtosis	6.04	3.47	-1.09	0.41
Std. Error of Kurtosis	0.18	0.22	0.22	0.22
Range	11.00	7.00	2.00	3.00
Minimum	1.00	0.00	0.00	0.00
Maximum	12.00	7.00	2.00	3.00

Source: Field Survey, 2003.

Table 5: Statistics on Demand for Beverages by SMECB Non-consumers

Statistics	**LCB Brands**	***Coffee Beverage Brands***	***Tea Beverage Brands***
Mean	1.25	0.29	0.52
Std. Deviation	0.67	0.48	0.56
Skewness	1.66	1.19	0.49
Std. Error of Skewness	0.10	0.10	0.10
Kurtosis	4.99	0.11	-0.77
Std. Error of Kurtosis	0.21	0.21	0.21
Range	5.00	2.00	2.00
Minimum	0.00	0.00	0.00
Maximum	5.00	2.00	2.00

Source: Field Survey, 2003.

Only about 5.3% of SMECB consumers did not demand LECB while 64.3% and 50.3% respectively did not demand for CBV and TBV (Table 6). From this (class), about 80.5% demanded for 1 or 2 brands of LECB, 35.1% demanded for 1 brand (out of the 2 brands) of CBV (available in the market); and 39.4% demanded for 1 brand (out of about 5 brands) of TBV (available in the market). Furthermore, only about 5.4% of SMECB non-consumers did not demand LECB while 71.5% and 51.4% did not demand for CBV and TBV respectively (Table 7). From this (class), about 94.4% demanded for 1 or 2 brands of LECB, 27.4% demanded for 1 brand out of 2 brands) of CBV (available in the market); and 45.2% demanded for 1 brand (out of about 5 brands) of TBV (available in the market).

Table 6: Beverage Brands Demanded by SMECB Consumer Respondents

Number of Brands	SMECB		LECB		Coffee Beverage		Tea Beverage	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
0	-	-	39	5.3	472	64.3	369	50.3
1	394	53.7	292	39.8	258	35.1	289	39.4
2	159	21.7	299	40.7	4	0.6	66	9
3	89	12.1	59	8	-	-	10	1.3
4	29	3.9	21	2.9	-	-	-	-
5	13	1.8	18	2.5	-	-	-	-
6	32	4.4	4	0.6	-	-	-	-
7	12	1.7	1	0.2	-	-	-	-
8	2	0.3	-	-	-	-	-	-
9	1	0.1	-	-	-	-	-	-
12	2	0.3	-	-	-	-	-	-
Total	734	100	734	100.0			734	100.0

Source: Field Survey, 2003

Table 7: Beverage Brands Demanded by SMECB Non-consumer Respondents

Number of Brands	LECB		Coffee Beverage		Tea Beverage	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
0	40	5.4	525	71.5	377	51.4
1	517	70.5	201	27.4	332	45.2
2	146	19.9	8	1.1	25	3.4
3	18	2.5	-	-	-	-
4	10	1.4	-	-	-	-
5	2	0.3	-	-	-	-
6	-	-	-	-	-	-
7	-	-	-	-	-	-
8	-	-	-	-	-	-
9	-	-	-	-	-	-
12	-	-	-	-	-	-
Total	734	100.0			734	100.0

Source: Field Survey, 2003

With regards to preference for beverage(s), 66.1% and 74.6% respectively of SMECB consumers and non-consumers most preferred cocoa beverage(s) above CBV and TBV (Table 8 and Table 9). However, 54% and 59.6% of SMECB consumers and non-consumers respectively preferred TBV above any other beverage while 60.8% and 60.4% respectively of both categories less preferred CBV to any other beverage type (Table 8 and Table 9).

Conclusion: From the results obtained it can be revealed that:

i. most respondents favoured cocoa beverage(s) above any other type;
ii. there is a strong indication of brand loyalty by consumers;
iii. SMECB enjoyed market acceptability. However, the beverage (SMECB) can further be improved to boost its market performance.

The above findings imply that beverage consumption has a good future in Nigeria. Hence, with efforts on promotion of beverage consumption in Nigeria, beverage crop market will rely less on exportation.

Table 8: Beverage Rankings by SMECB consumer Respondents

Ranking	***Cocoa Beverage***		***Coffee Beverage***		***Tea Beverage***	
	Frequency	***Percent***	***Frequency***	***Percent***	***Frequency***	***Percent***
Most Preferred	485	66.1	49	6.7	77	10.5
Preferred	82	11.2	63	8.6	396	54.0
Less Preferred	40	5.4	446	60.8	75	10.2
Preferred cocoa & tea equally	39	5.3	6	0.8	44	6.0
Preferred coffee & tea equally	-	-	22	3.0	22	3.0
Preferred cocoa & coffee equally	12	1.6	12	1.6	-	-
Preferred the three equally	74	10.1	71	9.7	73	9.9
Do not consume	2	0.3	65	8.9	47	6.4
Total	***734***	***100.0***	***734***	***100.0***	***734***	***100.0***

Source: Field Survey, 2003

Table 9: Beverage Rankings by SMECB Non-consumer Respondents

Ranking	***Cocoa Beverage***		***Coffee Beverage***		***Tea Beverage***	
	Frequency	***Percent***	**Frequency**	**Percent**	***Frequency***	***Percent***
Most Preferred	507	74.6	31	4.5	41	6
Preferred	42	6.2	73	10.7	405	59.6
Less Preferred	26	3.9	410	60.4	73	10.8
Preferred cocoa & tea equally	37	5.4	-	-	35	5.2
Preferred coffee & tea equally	-	-	54	8	54	8
Preferred cocoa & coffee equally	10	1.4	10	1.5	-	-
Preferred the three equally	39	5.7	39	5.7	39	5.7
Do not consume	19	2.8	62	9.2	32	4.7
Total	***679***	***100***	***679***	***100***	***679***	***100***

Source: Field Survey, 2003

Project 4: The Effects of Weather on Cocoa Production in Different Ecological Zones in Nigeria.

(Oluyole, K.A. and R. A. Sanusi)

Introduction

Agriculture belongs to the real sector of the Nigerian economy. Since 1999, the Nigerian GDP has been growing at an average annual growth rate of 3.5 % (Daramola, 2004). According to him, The modest growth in the agricultural sector has been traced to favorable weather conditions.

Rainfall and other weather variables such as temperature and sunshine are major factors influencing variations in crop yields, production, soil utilization and conservation. Yield uncertainties due to excessive drought or too much rainfall are common phenomenon in agriculture (Akintola, 1986). Weather variables varies from one region to the other and because of the variability in climate change, some agricultural crops and cropping system have been developed for, adapted to these varied regimes of climate (Haw *et al*., 1983). The climate of a place determines the vegetation of such a place and the vegetation of an area informs the ecology of the area. Therefore, the ecology of an area is essentially a response to the climate of such a place. Nigeria has two broad agro-ecological zones namely the forest and the savannah while derived savannah is a transition from forest to savannah. However, notable agro-ecological zones in Nigeria where cocoa is produced are Mangrove/Swamp forest, Rain forest, Derived savannah and Montainic savannah zones.

Objectives

1. To determine the relative magnitude of weather variables (specifically rainfall and temperature) and cocoa output in different ecological zones.
2. To determine whether there's significant variation in weather variables among the different ecological zones.
3. To determine the extent of the effect of each weather variable on cocoa output in different ecological zones.

Methodology: Secondary data was exclusively used for the study. The data was collected from Akintola (1986), CBN Annual Reports and statement of Accounts (Various Issues), Cocoa Statistics and Cocoa Market Report of Gill and Duffus (various issues) and the Meteorological Department of the Federal Ministry of Aviation. Data was collected on Mean Annual Temperature (MAT), Mean Annual Rainfall (MAR), Annual cocoa output and Annual cocoa hectarage for each of the cocoa producing agro-ecological zones for the period 1970 to 2002 (Thirty three years). The four agro-ecological zones identified with cocoa production are Mangrove**/**Swamp zone which includes Akwa Ibom, Delta and Cross Rivers states as the cocoa producing states in the zone; Rain forest zone which includes Ondo, Ogun, Osun, Oyo, Edo, Ekiti and Abia states as the cocoa producing states in the zone; Derived savannah zone which includes Kwara and Kogi states as the only two cocoa producing states in the zone and Montainic savannah zone which covers Taraba and Adamawa states. The data collected was analysed with the use the use of Descriptive Statistics, Analysis of Variance (ANOVA) and Ordinary Least Square (OLS) Regression Analysis.

Results and Discussion:

The result shows that Derived savannah zone has the highest Mean Annual Temperature (MAT) of 26.7% of the total MAT in all the agro-ecological zones while the highest rainfall was recorded in Mangrove/Swamp forest zone. The highest cocoa output (54.0%) was however recorded in Rain forest ecological zone. The result of ANOVA shows that there's significant difference in the amount of rainfall as well as cocoa output among the four agro-ecological zones. Fcalculated being greater than Ftabulated (Table 4). The result of the Regression Analysis shows that rainfall is the only weather variable that significantly affect cocoa output in all the zones except Montainic

zone. The estimate of rainfall in Mangrove, Rain forest and Derived savannah zone has positive sign which shows that rainfall is positively related to cocoa Output in the zones, that is, the higher the rainfall the higher the cocoa output in the zones. Also, the sign of the estimate of cocoa hectarage is in accordance with apriori expectation, that is, cocoa hectarage is positively related to the level of cocoa output in the zones.

Summary and Conclusion

The study summarizes and concludes as follows:

1. The Agro-ecological zone with the highest Mean Annual Temperature (MAT) is Derived savannah zone with 26.8% of the total MAT in all the zones.
2. Mangrove/Swamp zone has the highest Mean Annual Rainfall (MAR) with 40.3% of the total rainfall in all the zones.
3. The highest cocoa output was recorded in the Rain forest zone with 54.0% of the total output in all the four Agro-ecological zones.
4. The result of the Analysis of Variance (ANOVA) revealed that there's significant difference in the amount of rainfall as well as cocoa output in the four Agro-ecological zones.
5. Regression Analysis showed that rainfall is a critical factor in determining the level of output of cocoa in all the zones except Montainic savannah zone.

Table 1. Total Mean Annual Temperature for the period 1970-2002 for different Agro-ecological zones.

Ecological zone	**Total Mean Annual Temperature/^{0}C**	**Percentage**
Mangrove/Swamp	644.2	25.2
Rain forest	675.9	26.5
Derived savannah	683.6	26.8
Montainic savannah	550.5	21.5
Total	2554.2	100.0

Source: Meteorological Department, Ministry of Aviation.

Table 2. Total Mean Annual Rainfall for the period 1970-2002 for different Agro-ecological zones.

Ecological zone	**Total Mean Annual Rainfall/mm**	**Percentage**
Mangrove/Swamp	50471.4	40.3
Rain forest	33481.0	26.7
Derived savannah	22737.1	18.2
Montainic savannah	18489.5	14.8
Total	125179.0	100.0

Source: Meteorological Department, Ministry of Aviation.

Table 3. Total cocoa output for the period 1970-2002 for different Agro- ecological zones.

Ecological zone	**Total Amount of cocoa output/Mt**	**Percentage**
Mangrove/Swamp	1959.3	35.0

Rain forest	3022.9	54.0
Derived savannah	558.8	10.0
Montainic savannah	56.0	01.0
Total	5597.0	100.0

Sources: CBN (1997, 1998 and 2001); FAO (1985, 1990, 1993 and 1997); Government Gazette (Various Issues); NCMB (1983).

Table 4.Summary of the result of the Analysis of Variance (ANOVA) for Temperature, Rainfall and Cocoa output among the four Agro-ecological zones.

Variable	**Fvalue**	**Pvalue**
Temperature	1.639	0.063
Rainfall	5.175	1.0201E-07
Cocoa output	4.905	1.12682E-07

Source: SPSS software Computer Analysis printout.

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- AUDIT

COCOA RESEARCH INSTITUTE OF NIGERIA, IBADAN
FEDERAL MINISTRY OF AGRICULTURE &RURAL DEVELOPMENT
BALANCE SHEET AS AT 31ST DECEMBER, 2005

	Notes	2005	2004
		N	N
		N	N
Fixed Assets	1	125,838,816	96,727,899
Current Assets			
Stock	2	5,532,285	11,192,317
Debtors	3	16,444,080	7,895,900
Bank & Cash Balances	4	15,471,741	57,600,975
Fixed Deposits		-	3,800,000
		37,448,106	80,489,192
Current Liabilities			
Creditors & Accruals	5	(51,226,398)	(29,439,107)
Net Current Assets		(13,778292)	51,050,085
		112,060,524	**147,777,984**
		=========	=========
Represented:-			
Consolidated Fund			
Capital Fund	7a	191,197,309	191,197,309
Accumulated fund	6	(80,106,785)	(55,689,841)

Housing loan fund	570,000	570,000
Car loan fund	400,000	400,000
	112,060,524	**147,777,984**
	==========	==========

Executive Director

Head of Finance and Account

COCOA RESEARCH INSTITUTE OF NIGERIA, IBADAN
FEDERAL MINISTRY OF AGRICULTURE &RURAL DEVELOPMENT
INCOME AND EXPENDITURE ACCOUNTS FOR THE YEAR ENDED 31ST DECEMBER, 2005.

	Notes	2005		2004	
	N	N		N	N
INCOME					
Recurrent Allocation	7b	268,342,782			244,997,615
Other Income	8	5,692,570			19,422,161
		274,035,352			**264,419,776**
Expenditure					
Research & Personnel Cost	9	278,247,380		228,713,027	
Administrative Expenses	10	39,754,110		40,944,643	
Financial & Professional Chr.	11	25,785,051		15,103,525	
			(343,786,541)		(284,761,195)
			(69,751,189)		**(20,341,419)**
			==========		==========

Executive Director

Head of Finance and Account

YEAR 2005 ANNUAL REPORT, ENGINEERING WORKS DIVISION (Ag. Head: A.T.Bakare)

Preamble:
During the year 2005, the Engineering Works Division was reorganized into ten functional sections, viz: -

1.	Motor Vehicles Mechanical Workshop.	2.	Electrical/Telecommunications Workshop.
3.	Carpentry Workshop.	4.	Agricultural Equipment Mechanical Workshop.
5.	Machines-shop Mechanical Workshop.	6.	Building and Road Works.
7.	Plumbing Workshop.	8.	Painting and Sign-writing.
9.	Drawing Office.	10.	Transport Office.

It would be seen at a glance that relative to the year 2005, the three units of the erstwhile Mechanical Section, i.e. Motor Vehicles, Agricultural Equipment and Machineshop, had become full-fledged Sections in recognition of specialization in the available manpower.

Sectional Reports:
The contribution of the Engineering Works Division during the year was the aggregate of the achievements in each of its above-named sections, as presented hereafter.

1. Motor Vehicles Mechanical Workshop:

(i) Servicing and minor repair of the Institute's fleet of vehicles.

(ii) Major repair works involving engine replacement / overhaul carried out on Toyota Tercel car FG564S03, Mitsubishi station wagon FG02G03, Excel Hyundai FG06G03, Toyota Hilux pick-up van FG07B03, Toyota Hiace busFG193S03 and Peugeot 504 saloon car FG604S03.

(iii) The staff transit Eicher bus was maintained until the arrangement for fuelling made it practically uneconomical to operate.

2. Electrical/Telecommunications Workshop:

(i) Supply of electric power was kept 'steady' through rapid response to fault reports.

(ii) Liaison with and assisting the Power Holding Company of Nigeria (PHCN), in clearing faults on the external high tension (HT) power supply network to the institute.

(iii) Replacement with wooden poles of two HT poles and three low tension (LT) poles that were damaged during tree-felling exercise.

(iv) Supervised the servicing of HT to LT transformers.

(v) Supervised the installation of a new 250kVA power generator at the senior staff quarters (SSQ).

(vi) Rewiring of the Guest house chalet 1A and 1B.

(vii) Operation and maintenance of the borehole at the junior staff quarter's (JSQ) area, for water supply.

(viii) Wiring installation of the new bakery.

(ix) Maintenance of the HT and LT power lines within the institute's estate.

(x) Wiring installation for powering the Oduatel communications equipment room.

(xi) Supervision of the installation of Oduatel telephone equipment.

(xii) Reading of the electric energy meters at the JSQ, raising and distribution of electricity bills.

(xiii) Operation and maintenance of the institutes fleet of electric power generating plants.

3. Carpentry Workshop:

(i) General renovation works on the Guest house main block, chalets 1A, 1B and 2A.

(ii) Roofing of farm houses at Zones 4, 7 and 9.

(iii) Roofing and the construction of door frames and doors, for the new bakery.

(iv) Construction of new shed at the central plant nursery.

(v) Construction of new big doors for the technical store.

(vi) Ceiling of the marketing office annexed to the staff canteen.

(vii) Renetting of Duplex 6A, 10B, 9A, 9B and 11A.

(viii) Construction and fixing of garage door for Duplex 11A.

(ix) Roofing of the SSQ power house.

(x) Construction of shed pavilion at the CRIN staff school sports field.

(xi) General repair works within the institute.

4. Agricultural Equipment Mechanical Workshop:

(i) Repair and maintenance of tractors Massey Fergusson (MF) FG195S03, Case International (CI) FG224B03.

(ii) Replacement of the gear box and routine maintenance of the tractor-powered rotary slasher.

(iii) Repair of engine-powered knapsack sprayers for the Plantation and Estate Management.

(iv) Dismantling of the final drive system of CI tractor FG225B03.

5. Machines-shop Mechanical Workshop:

(i) Turning of circular shafts for Oduatel equipment room and new bakery doors.

(ii) Turning of circular shaft for Water work's pumping machine.

(iii) Turning of cones and washers for motor cycle FG242B03.

(iv) Threading/cutting of screws for general use on the Eicher bus and Carpentry section's planning machine.

(v) Drilling/boring operations, viz: - (a) Bushings for Zone 6's wheel barrows. (b) 145 tags for Agronomy Group and (c) Plates and brackets for tractors.

(vi) Milling of keys and key-ways for Water works machines, plates and brackets for tractors.

(vii) Reconditioning of hub, steering racks and engine seats for vehicles and gate valves for the borehole.

(viii) Fabrication of burglary-proofs for offices, Oduatel equipment room and other approved locations.

(ix) Blacksmithing operations including the sealing of vehicles' radiators and reconditioning of slasher blades.

6. Building and Road Works: (i) Modest maintenance by mud-patching, of the roads.
(ii) Building of farm houses and detached ventilated improved pit toilets at the Zones.
(iii) Rehabilitation work at the Guest house main building.
(iv) Construction of the new bakery building.
(v) Construction of drainage gutter at the JSQ.
(vi) Raising and casting of slab for the sunken septic tank at the Health centre.
(vii) Sundry maintenance work on the institute's official and residential buildings.

7. Plumbing Workshop:
(i) Laying of conduit to transport water discharged from tanker to remote underground reservoir to service the laboratories and administrative block.
(ii) Plumbing renovation works in the guest house main block and chalets 1A and B.
(iii) Installation and general maintenance of storage tanks at the guest house.
(iv) Installation of two tanks for use as temporary reservoir at the SSQ's new borehole.
(v) Clearing of plumbing faults reported through the 'works order system', in the offices as well as the residential quarters.
(vi) Maintenance of water supply facilities at the central plant nursery.
(vii) Routine pumping of water from the underground reservoir to the overhead service tank for distribution throughout the laboratories and administrative block complex.

8. Painting and Sign-writing:
(i) Repainting of the Guest house's main block, chalet 1A, 1B and 2A.
(ii) Repainting and re-writing of the main gate sign post of the institute.
(iii) Painting of the newly constructed bakery building.
(iv) Painting of offices and residential buildings as approved through the works order system.

9. Drawing Office:
(i) Retracing of the map of CRIN experiment zones for extension group.
(ii) Drawing of the map of Africa for the Crop Protection Unit (CPU).
(iii) Drawing of figures attached to given graphs for Economics and Statistics Group.
(iv) Drawing of a map of Nigeria showing the experimental sites at Ibadan and Kusuku.
(v) Drawing of the plan of the proposed CRIN multipurpose shopping complex.
(vi) Sketch and drawing of proposed CRIN modest fuel station.

10. Transport Office:
(i) Driving of and caring for the official vehicles attached to the institute's executive officers and other internal management committee (IMC), members.
(ii) Driving of and caring for the official ambulance or any other vehicles designated to standby for duty at Health centre.
(iii) Vehicular movement of personnel and materials to approved locations.
(iv) Supply of water for domestic and laboratory use with the MAN diesel tanker FG512B03, until it broke down during the year; however safe improvisation was evolved thereafter.

Constraints:
It is pertinent to report that three areas of constraints were prominent, they are: -

1. **Funds:** Many Cash Advance Requests for jobs which were approved by the Executive Director for funding were either untraceable at the Accounts office, or finally unfunded as at the end of the year.
2. **Skilled manpower:** Serious shortage in skilled manpower affected the Electrical, Carpentry and Plumbing sections as a result of retirement and demise of erstwhile staff members.
3. **Tools and materials:** Shortage of appropriate tools e.g. HT &LT ladders for the Electrical Section. Protective clothing was not provided as required.

Conclusion: The members of the Engineering Works Division remained committed to contributing the very best to support the Institute's corporate objectives.

Plantation / Estate Management, CRIN Headquarters, Ibadan.

ANNUAL REPORTS FOR YEAR 2005

(A) Plantation Activities

1. During the year under Review, Regular Cultural Operations were carried out almost in all the zonal plots – Fire Prevention Strategies in terms of cutting of fire traces, were timely done.

2. Operations such as land preparation, clearing ; packing ; felling; cross cutting and evacuations, lining; pegging; planting; weeding; supplying of missing stands; removal of mistletoes; moribund plants; over-head shades; prunning; spraying and harvesting were carried out.

The effectiveness of these operations; revealed the higher productivity achieved in our mandate crops.

3. Incidence of Black Pod diseases was minimal as every measure was taken in ensuring timely spraying of the plots with lime Bordeaux Mixture and also the removal of over-head shades enhanced sunlight thus decreasing diseases and pests infestation which on the long run increase pods' production.

4. Sales / Marketing of dry cocoa beans; kola-nuts, cashew seedlings were done during the year in review.

5. Rehabilitation:- This was done almost in all the zones under the umbrella of "Gapping – Up" of vacant and dead stands.

(B) Harvested Cocoa Pods Yr. 2005:- A gross total No of 399,464 fresh cocoa pods were harvested during the year under report viz January – December.

TABLE I

YR. 2005 HARVESTED COCOA PODS
DATA COLLECTED FROM FERMENTARY UNIT

MONTHS	NO OF PODS HARVESTED
JANUARY	43, 985
FEBRUARY	22, 582
MARCH	15, 052
APRIL	35, 152
MAY	30, 406
JUNE	6080
JULY	2007
AUGUST	1920

SEPTEMBER	33164
OCTOBER	70330
NOVEMBER	81, 694
DECEMBER	57, 092
G.TOTAL	**399464 (COCOA PODS)**

(C) 55, 432 Cocoa pods supplied to the "NCDC" Programme under the Year in Review – DATA from PEM's Unit October - December

TABLE II

YEAR 2005/ COCOA POD SUPPLIED FROM CRIN TO NCDC. PROGRAMME

MONTHS	STATE	NO OF COCOA PODS COLLECTED
OCT, 2005	OYO	1,940
,,	OSUN	1,500
NOV, 2005	OSUN	11, 573
,,	OGUN	20, 580
,,	OYO	2, 250
DEC, 2005	OYO	12, 760
,,	OGUN	4, 829
	TOTAL	**55, 432**

(D) Personnel:- There is a continuous increase in the shortage of personnel in terms of staff and labour force. This is as a result of

(i) Our field staff of different cadres who had left and shortly about to leave on Retirement and

(ii) Due to the financial constraints of the institute

Total number of staff / labour force under the year in Review are 89 / 37 respectively

Sir,

The following members of staff are about to leave the Institute's Service on Retirement and therefore need immediate replacement in view of the posts they hold in the zones.

NAMES	POST	ZONES	DATE OF RETIREMENT
a. Mr. A Borokini	CAS	Hd. G.MESS	1st March 06
b. Mr. M. Efunla	CAS	Zonal Leader 2,3/4	14th June 06
c. Mrs. C.O. Ogundipe	CAS	Zonal Leader I.	1st March 06
d. Mr. Daniel Oyawale	CAFO	Zone I	March 2006
e. Mr. Lawrence Taiwo	A/ CAFO	Zone 2/3/4	June 2006
f. Mr. Ruafai	A/CAFO	Zone 6	20th Feb. 05
g. Mr. Salako	A/CAFO	Zone 7	1st April 05

(B) GMESS

During the period under review, various maintenance operations/sanitation of the Physical Environment were carried out at different essential locations e.g. offices/laboratory complex; the old laboratory, the chairman's lodge, Rest house/Challet buildings; football field etc.

In this year under Review 250 stands of plantain suckers were planted in May/June viz prior the planting of the seedlings in the new ERLS strip of an land iniciation by the Asst.Director (PBM/T). This also serves as part of the Instittute Rehabilitation Programme with 280 stands of Cocoa Seedlings already planted under the fully established plantain shades.

Year 2005 GMESS Staff Strength.

The total number of staff strength is 20.

TABLE IV

CADRE	NUMBER	REMARKS
ACAS	I	
ACAFO	I	
SAFO	2	
AFO	6	
AFA (I)	9	
MESSENGER	1	

Observation / Constraints / Recommendations on Zonal Activities.

1. There is the need for improvemen t viz gross shortage of labour force to cope with all cultural operations of the Institute's Mandate Crops.
2. The Zonal axis e.g. Zones 7, 8, 5,/6 are very porous to encroachment and stealing by unwanted visitors especially at this dry season; whereby the water bank has subsided greatly.
3. The security men in the area of day and night patrols are currently near non-existence. This has effect on Revenue Generation from farm produce

4. The Kola Laboratory (Old Lab) is depreciating very fast from the roof. I suggest Sir, that the Committee raised in the past for recommendation on its refurbishment should revisit the issue in this year for sustainability purposes and re-roofing.
5. The final demarcation of the zonal Boundary between Crin/ State forestry Department has not been carried out as earlier agreed upon by the two bodies
6. Provision of Drinkable Water for our labour gangs
7. Adequate supply of farm-tools and implement pumps and protective clothing's.
8. Inadequate Agro-Chemicals.
9. The Existing Mud Zonal office at zone Six (6) behind the Director's Lodge is now a death trap and the new one under construction has been abandoned at the lintel level and some other zones.
10. The slasher and lawn mowers which supposed to complement the labour force were completely unfunctional almos t through out the year.
11. I wish to appeal further that casual workers conversion should have an upward review.
12. No Enough " IMPREST". to run the affairs of the " PEM" and "zones". This imprest is used mainly for the purchase of diesel and lubricants into the Institute's tractor and at times the " EICHER – TRUCK.

Conclusion / Appreciation

On behalf of my colleagues; the Agric Superintendents Cadres at different locations in the zones, I'm seizing this opportunity to thank the Director, Chief-Executive especially for the granting of funds for the procurement of chemicals at the right time; which enhanced the efficiency of our work at the various zones and nevertheless the effect to have increase in production We are really grateful to you Sir. And more of this.

More so to my able coordinator, Dr. Fademi; the Asst. Director (PBM/T) for your efforts so far for a betterment on the field. I say thank you Sir, it is wonderful of you.

Generally; to the entire "IMC" members, I say a very Big "Thank You All"

S. Adesiyan (Mrs)
Head PEM. Division
CRIN Hqrts.

YEAR 2005 ANNUAL REPORT FOR OWENA SUB- STATION.

OFFICER IN CHARGE AKINROWO S.E. (MRS)

PHYSICAL DEVELOPMENT:- The physical developments carried out during the year under review include:-

a. Window and door blind for office and the rest house.
b. Additional pipes were bought to replace the damaged water pipes in the quarters.
c. Overhauling of the station vehicle FG 742 B03.
d. Panel beating and repainting of FG 742B03
e. Purchase and installation of Sat Dish in the rest house.
f. Electronic gadgets were purchased for the rest house
g. Purchase of kitchen utensils for the rest house
h. Purchase of water closet and wash hand basin for the rest house.
i. The station tractor was repaired.
j. Purchase of ceiling fans for the rest house.
k. Purchase of electronic cabinet for the rest house.

VEHICLES:- Total overhauling of the engine of the Mitsubishi pick –up van was carried out.

The panel beating and painting the pick up was carried out during the year in review.

REVENUE:- An annual revenue of Six hundred and seventy-nine thousand, seven hundred and fifty naira (N679,750.00) was realized from sales of farm produce and other services during the year under review. Twenty thousand five hundred and five (20,505) Cocoa pods were supplied to Ondo, Ekiti and Kwara States for NCDC programme during the year in review. This world have increased the station's revenue by N1,025,250.00

The breakdown is as shown in the table below:

Nos	ITEMS	1ST Quarters	2nd Quarters	3rd Quarters	4th Quarters Total
1	Cocoa Beans	9,460.00	53,245.00	54,450.00	76,075.00 193,230.00
2	Cocoa Pods	25,250.00	8,500.00	1,500.00	4,500.00 39,750.00
3	Cocoa Seedlings	164,750.00	43,795.00	9,270.00	- 217,815.00
4	Coffee Seedlings	-	75.00	-	- 75.00
5	Plantain	1,800.00	-	2.200.00	4,800.00 8,800.00
6	Banana	300.00	-	-	150.00 450.00
7	Rent Pay roll	25,500.00	26,500.00	27,500.00	27,000.00 106,500.00
8	Rent Tenants	22,500.00	19,800.00	5,250.00	10,500.00 58,050.00
9	Electricity Pay roll	-	-	11,400.00	11,160.00 22,560.00

UHONMORA

YEAR 2005 ANNUAL REPORT ON OCHAJA SUBSTATION

1. **PERSONNEL REPORT**: The staff strength as at 31 December 2005 was made up of 3 senior staff and 17 junior members. The number of the casual workers has been pruned down

from 13 to 6 from the Headquarters and their wages has been increased from 100.00 per day to N200.00 per day. This will enable the casual workers to put in more efforts and dedicate their honestly and effectively.

2. (i) **MAINTENANCE OF RESEARCH AND COMMERCIAL PLOTS**

Constant maintenance of both research and commercial plots and efficient supervision of all experimental on behalf of research staff were carried out. High standard of environmental sanitation in both the office premises and residential quarters are being maintained during the period of report.

(ii) **FIRE TRACES**: As a tradition every year, fire traces were carried out round the whole farm in order to safeguard our farm from fire outbreak from neighboring farms.

(iii) **NURSERY**: The kola nut which were harvested at Acharu (CRIN EXPERIMENTAL PLOT) properly cured. Some of these cured nuts were raised at pre-nursery, potted and later on, transferred straight to the nursery for proper care.

Also because of the low patronage of cashew seedlings by farmers only 2,500 seedlings were raised. Constant watering and spraying.

(iv) **PRUNING**: Light pruning exercise was carried out in the plots so as to make the picking of dropped cashew nuts to be easy which makes the plots very accessible.

(v) **STATE OF FIELD/PLANTATION**: All the experimental plots were properly maintained during the period of report.

Also fire traces was also carried out, security was so tight so as to prevent pilfering during the picking of cashew picking.

1. **DATA COLLECTION**: Data collection was done according to the instructions from the investigators at the headquarters.

All the data collected so far have been sent down to different researchers accordingly.

2. **DISPENSARY**: Few members of staff were treated at our dispensary between January – December 2005. The serious cases were being referred to the General Hospital at Egume.

5. **GENERATING SET**: The generating set is in perfect condition and very effective. The set was newly overhauled from the budgetary allocation fund for 2004 meant for this station.

6. **CLUB HOUSE**: Our club house is now wearing a new look since it has been rehabilitated since 2003. We still face the problem of reactivation of our recharge card for our DSTV which is N10,800.00

The station could not afford the monthly subscription on this DSTV as at now because there was no overhead from headquarters throughout the year 2005.

STUDENT ON INDUSTRIAL ATTACHMENT

About 4 students from Kogi State University were here for industrial attachment. They were really being expressed to CRIN activities on all our mandate crops.

WEATHER RECORD

Below shows the rainfall distribution pattern for the period under review, January to December 2005.

MONTH	NO. OF RAINING DAYS	TOTAL RAINFALL PER MONTH (MM)
January	1	1.5
February	2	22.3
March	-	-
April	4	130.8
May	7	196.9
June	11	328.1
July	10	182.8
August	4	25.1
September	8	296.1
October	5	152.4
November	-	-
December	1	2.9
TOTAL	53	1338.5
AVERAGE	5	25.26

MAMBILLA

CRIN, IBEKU SUBSTATION, UMUAHIA, ABIA STATE

28th January, 2006.

The Executive Director,
CRIN HQ.
Ibadan.

Thro'
The Assistant Director (R &S)
CRIN HQ.,
Ibadan.

Thro'
The Co-ordinator (Ibeku Substation)
CRIN HQ.,
Ibadan.

Sir,

HANDING IN OF 2005 ANNUAL REPORT

FIELD OPERATION: Routine Management operations vis-a-vis, slashing, prunning spraying against pests, diseases and control of weeds, harvesting processing of farm produce were carried out during the year under review in all the maintained plots within the estate both at Ibeku and Ugbenu in Anambra State. Ground maintanance of office area and farm roads are carried out.

PHYSICAL DEVELOPMENT: Minor repairs were carried out in the main office block. I wish to state further that there is need to repair the main office block at Ugbenu because of the deteriorating condition of the building. This had been mentioned in my earlier reports. At Ibeku Substation, the two old buildings inherited from thedefunct Ministry of Agriculture of then Eastern Region are also in a State of disrepairs. It would be highly appreciated if fund is made available for the station for the repairs.

TRANSPORTATION: 2005 had witness a very serious harsh condition in terms of vehicle maintenance in Ibeku Substation. Because of unavailability of tangible revenue

and upkeep subvention, it was very difficult to maintain our vehicle. All the staff were advised to contribute individually to purchase fuel diesel and lubricant which was not very easy. I shall be grateful if some letter written about this can be approved so that reimbursement will be given to the staffer.

STAFF AND LABOUR DISPOSITION: The staff strength as at the end of December, 2005 stood at six (6) Senior and Eleven (11) Junior staff. The SEnior Staff includes one Assistant Chief Agric. Supretendent. One Higher Agric. Supt. Two Chief Agric. Field Overseer and one Chief Driver. Mr. Phillip Oguigo (Agric. Supt.) and Mr. Emma Ihejirika were transfered from CRIN Uhomora Sub-station and HQ (Headquarters) respectively, during the year 2005.

RESEARCH ACTIVITIES: Research, activities improves this year, some group of researchers visited the Substation and engaged in some Research work.
They include: Dr. S.S. Omolaja, Dr. A.O. Famaye and Mr. R.R. Ipinmoroti.
Some tea seedlings from Mambilla Substation were dropped by the team for plating and this had been given a close attention.

EXTENSION ACTIVITIES: During the year some farmers' farms were visited on request to asses their cocoa rehabilitation problems. Where possible recommendation on the spot were given to the framers as regards what to do. Notable among the farmers whose farms were visited during the year were Chief Israel Nwosu of Isieke village, Messers, Lawrence Okpokiri of Ago village. Isakole Road Umuahia, Mr. Uche Madukor of Ajatta Okwuru village in Umuahia North L.G.A.

NATIONAL COCOA DEVELOPMENT COMMITTEE (NCDC): A total of 5500 healthy cocoa pods were supplied to Akwa Ibom State Ministry of Agriculture and Natural Resources for the Programme . The number had been sent to the Executive Director through Dr. Omolaja the Co-ordinator on (NCDC).

REVENUE: This is the comprehensive state of the revenue generated throughout the year 2005.

Particular	1st quarter	2nd quaters	3rd quarters	4th quarters	Total
Cocoa Beans	19618.50	-	6480.00	11900.00	37998.50
Cocoa Pods	-	-	10000.00	-	10000.00
Firewood	1020.00	-	500.00	-	1520.00

Oranges	360.00	-	-	-	360.00
Banana	375.00	185.00	150.00	300.00	1010.00
Pineaple	150.00	-	-	-	150.00
Cashew nuts	-	4300.00	-	-	4300.00
Palm fruits	-	-	1200.00	-	1200.00
Timber	-	-	10000.00	-	10000.00
SUB Total	**21523.50**	**4485.00**	**28230.00**	**12200.00**	**66588.50**

*5500 cocoa pods suppiled to Akwa - Ibom State should have been part of our revenue if processed and dried.

GENERAL REMARK: My 4th quarterly report refers - with the assistance of CRIN Management (IMC) and the efforts of the Police at the Central Police Station (CPS) Umuahia, I am happy to inform you that peace and tranquility has come back to the Substation. Six(6) of these hoodlums had been arrested in December, 2005 and since then we have not been experiencing terrorising again. This has really allowed us to supply the Akwa - Ibom State NCDC Cocoa pods allocations.

The boys had been charge to Court and two Court sitting had come up on the 4th and 25th Jaunary, 2005 that had been adjoured to 24th February, 2005, the next court sitting will be on Sir, your assistance again on logistics will be highly appreciated so that our effort will not be forfeited by the Police.

OUTSTANDING CLAIMS: Sir, I shall be grateful if the following outstanding claims can be paid. The claims mentioned had been approved by the Executive Director since 2004 and have included in all my reports since 2004 till date.

I wish we shall be remembered whenever fund is available:

These are the claims:-	(i)	Outstanding claims 2003 -2004 -	166,800.00
	(ii)	,, ,, ,, ,, 2004 - 2005 -	150,000.00
	(iii)	Reimburisement on Diesel Fuel & Lubricant contributed by my staff since May, 20	76,800.00
		Total	**₦393,600.00**

Thanking you for your consideration.

VISITORS:

Visitors to CRIN Ibeku Substation in 2005 are numerous. They includes our Executive Director Prof. G.O.Iremiren. Asst. Director, Dr. O. Olubamiwa and Asst. Director Dr. S. Fademi. Other that visit are Researchers, Agric. Techenologists and Administrative Staff from CRIN Headquarters for official assignments. Others are host of important personalities, Cocoa farmers and students from University of Agricuture, Colleges of Agric. and Secondary Schools for Excursion.

Thanks.

Adebayo Olusegun
STATION HEAD,
CRIN,IBEKUSUBSTATION,
UMUAHIA

AJASSOR